CHAPTER III

WATER RESOURCES

III. WATER RESOURCES

A. OVERVIEW

Water resources include streams, ponds, lakes, and groundwater. These resources serve as sources of drinking water, recreation, storm water conveyance, and habitat for a myriad of organisms. Water resources are subject to a variety of water quality problems and are significantly impacted by land disturbances and surface runoff within their watersheds. Over the past several years, Fairfax County has demonstrated a strong commitment to restore and protect its water resources through a variety of management and public outreach initiatives. Unless water resources are managed properly, the rapidly increasing demands put on watersheds, such as rapid development, can create many problems.

1. Watersheds

A watershed is all the surrounding land area that drains into a particular stream, river system, or larger body of water. Watersheds include both surface waters and groundwater. Everyone in Fairfax County lives in a watershed. Larger watersheds usually have sub-watersheds. There are 30 separate watersheds within the county (Figure III-1). For example, the largest watershed in Fairfax County, Difficult Run (58 square miles) has ten streams that drain into the main stream, Difficult Run. It, in turn, drains into the Potomac River. The Potomac River watershed is a sub-watershed of the even larger watershed, the Chesapeake Bay watershed, which is 64,000 square miles and extends from New York through Pennsylvania, Delaware, West Virginia, Maryland, Virginia, and the District of Columbia. All Fairfax County streams are in the Potomac River watershed and subsequently the Chesapeake Bay watershed.

2. Streams

A stream is a system of fresh water moving over the earth's surface. Fairfax County is criss-crossed by a number of streams, often called runs or creeks. These streams are considered flowing water habitats. Rainfall soaks into the earth and drains to low points within the surrounding land, then emerges from the ground as seeps, springs, and trickling headwaters. These tiny threads of running water join with others in the same drainage area to create a stream system. There is a natural progression in size from the smallest tributaries to the largest rivers into which they eventually flow. Perennial streams flow throughout the year and intermittent streams flow only part of the year. There are approximately 973 miles of perennial streams in Fairfax County. One-third of the land in the Fairfax County Park system, approximately 7,000 acres, is comprised of stream valleys. These stream valleys are significant corridors for the county trails system and wildlife.

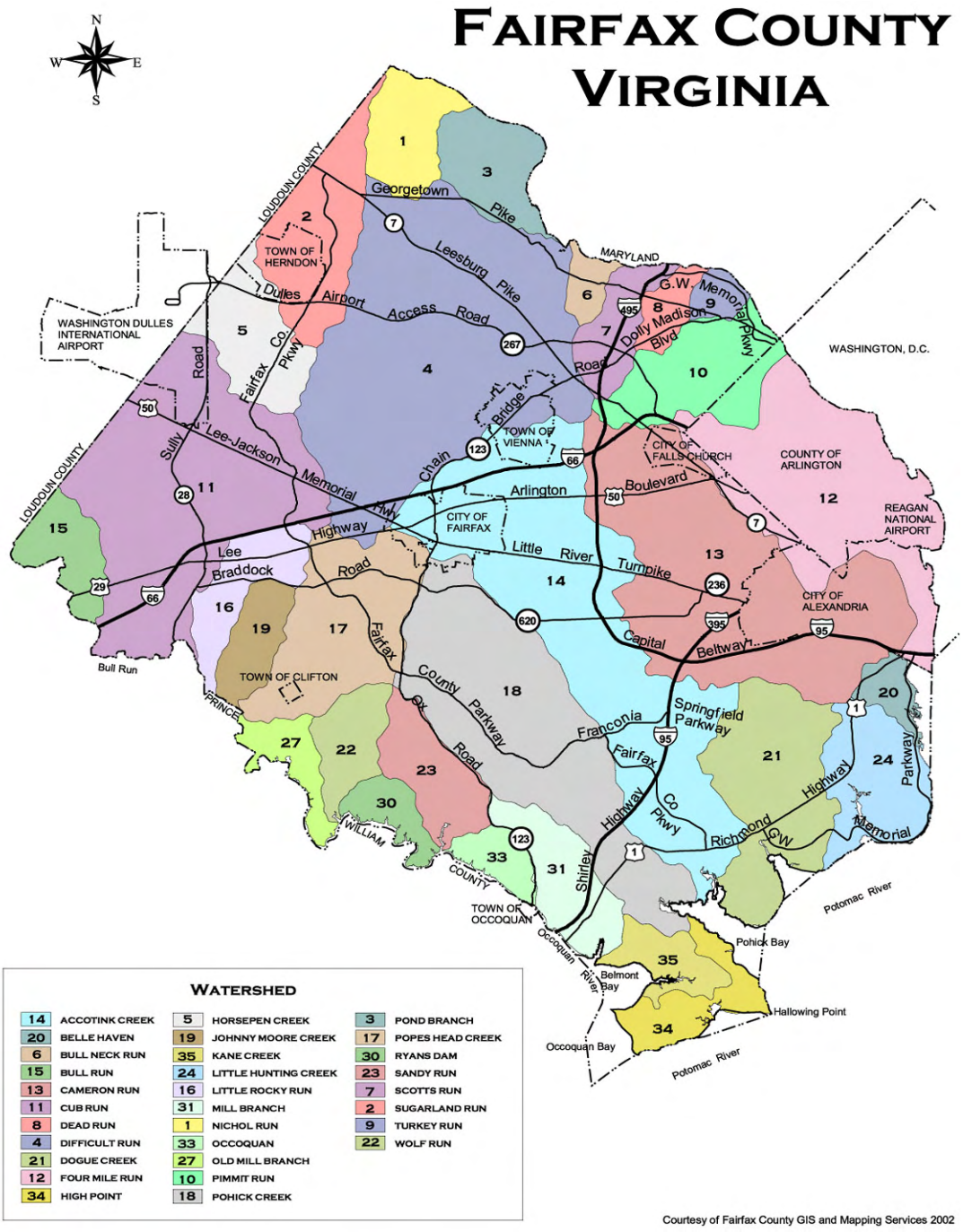

Figure III-1: Fairfax County Watershed Map

3. Stream Ecosystems and Communities

The bottom substrate of a stream can consist of boulders, cobbles, gravel, sand, and/or silt. The type and amount of substrate in a stream makes up the in-stream habitat. Within a stream are shallow, fast flowing areas called riffles. Dissolved oxygen levels are high because water is flowing over rocks, mixing air into the tumbling water. Alternating with riffles are deeper pools and runs where water speed slows and small particles of mineral and organic matter fall to the bottom and oxygen levels are reduced. Each of these stream regions has a diverse community of plants and animals that spend all or part of their life cycles in the water.

The aquatic food chain begins with leaves and other decaying plant and animal material called detritus. These materials are carried into the stream from the surrounding forests and fields by wind and water runoff. Aquatic vegetation such as algae is also an important food source. Benthic (bottom–dwelling) macro (large) invertebrates (without a back-bone) eat this organic matter. Benthic macroinvertebrates include aquatic insect larvae such as stoneflies, mayflies, caddisflies, and true flies as well as snails, clams, aquatic worms, and crustaceans such as crayfish. Fish, birds, and other streamside wildlife, such as frogs, salamanders, and small mammals, eat these macroinvertebrates.

4. Riparian Buffers and Wetlands

A buffer of trees and other types of vegetation lining the banks of streams, also called a riparian area, is another essential part of a healthy stream system. The temperature in a stream greatly affects how much oxygen it can hold. Since cooler water holds more oxygen, trees are vital along the bank or edge of stream or river. Shade from the tree canopy maintains cool water temperatures so the water will hold more oxygen.

Tree cover also provides food and woody debris for shelter when leaves and branches fall into a stream. Streamside forests offer food, nesting sites, and protection to a great diversity of wildlife, including birds, turtles, beaver, and snakes. Tree roots help stabilize stream banks and provide cover for fish, crayfish, and aquatic insects. Riparian buffers help slow down and filter runoff. Excess nutrients carried in runoff are absorbed by vegetation.

Wetland areas adjacent to streams can be forested or open wetlands. These wetlands serve as transitions to stream channels and help to attenuate the effect of stormwater and remove pollutants before they reach the stream. Wetlands provide important habitat for many organisms.

5. Oxygen

Oxygen is vital to organisms that live in a stream just as it is to terrestrial animals. Stream-dwelling animals use oxygen dissolved in the water. Aquatic insect larvae absorb oxygen through their body walls or by the use of gills, such as mayfly larvae. Fish absorb oxygen by drawing water in through the mouth where it passes over

internal gills. High levels of dissolved oxygen are essential to the life functions of a healthy stream community.

6. Nutrients

Nitrogen and phosphorus are nutrients essential to the growth and development of all plants. An overabundance of either, however, can damage stream ecosystems dramatically. Forested buffers can retain and use as much as 89% of the nitrogen and 80% of the phosphorus runoff associated with land use practices. In excess, these nutrients become major pollutants, causing the rapid growth of algae in streams, rivers, lakes, and estuaries. When the algae die and begin to decay, the bacteria breaking down the algae use up the dissolved oxygen necessary for other aquatic life.

7. Groundwater and the Water Cycle

Almost 98% of the water on earth is in liquid form and is found in oceans, lakes, ponds, rivers, and streams. The remaining 2% is found frozen in polar ice caps and glaciers, as moisture in soil, as vapor in the atmosphere, and in the bodies of living organisms.

Water evaporates from surface waters, and, in much smaller amounts, from moist soil surfaces, leaves of plants, and bodies of other organisms. This water, now water vapor, is carried up in the atmosphere by air currents. Eventually these water molecules fall to the Earth's surface as some form of precipitation (rain or snow). This water flows back into streams, then rivers, and eventually the ocean and the cycle starts over.

Some of the water that falls on the land percolates down through the soil until it reaches a zone of saturation. In the zone of saturation, all pores and cracks in the rocks and soils are filled with water (groundwater). The upper surface of the zone of saturation is called the water table. Groundwater provides base flow for streams and is the reason that streams and rivers have flow when it is not raining. Groundwater is the source of water in wells and provides water for plants through their roots. Eventually all groundwater reaches the oceans, thereby completing the water cycle.

B. POLLUTANTS AND OTHER IMPACTS ON STREAMS

1. Point and Nonpoint Source Pollution

Water pollution originates from either nonpoint or point sources. Nonpoint sources (NPS) include surface runoff, atmospheric deposition, and groundwater flow. Because of their diffuse and intermittent nature, NPS are difficult to control. NPS pollutant loads are greatest following rainfall and high flow events. A significant part of the NPS load consists of nutrients, including nitrogen and phosphorus (organic matter, fertilizer), which stimulate algal growth. Other NPS pollutants are sediment (from erosion, construction sites, and stream banks during high-flow, high-velocity

conditions), toxics (oil, paint, pesticides, chemicals, and metals), pathogens-fecal coliform bacteria (animal waste, failing septic systems, and leaking sewer systems), and trash.

Point sources are specific locations that discharge pollutants such as a discharge pipe. Because they are relatively constant and provide a steady flow of pollutants, they are easier to monitor and control. In the Potomac Basin, most point sources are wastewater treatment plants (WWTPs) or industrial discharges. Unlike NPS, point sources contribute relatively small portions of the nutrient loads during high flows and the majority during low flows.

2. The Effect of Imperviousness on Streams

As development occurs, natural areas that once had vegetative cover capable of absorbing water and filtering pollutants are replaced by impervious surfaces such as roads, driveways and buildings. With the increase in impervious surface and loss of vegetative cover, there is a concurrent increase in the amount and speed of stormwater runoff flowing into streams. Increased uncontrolled runoff causes stream erosion, resulting in scouring, down-cutting and over-widening of stream channels, and loss of riparian vegetation. Loss of shade results in increased water temperatures. During summer storms, runoff from heated impervious surfaces also raises water temperatures. In urban and suburban watersheds, rain flows off impervious surfaces such as parking lots and highways, carrying oil and other automobile wastes into streams. When stream channels become incised from down-cutting, they become disconnected from their floodplains. Water cannot get out of the banks onto the adjacent floodplain where flows can be dissipated and drop their sediment loads. High flows stay in the channel, resulting in increased erosion. Silt and sediment from erosion smother the stream bottom and destroy in-stream habitat for sensitive benthic macroinvertebrates.

Simultaneously, this results in an increased number of floods in downstream areas, due to the increased volume of water. Over time, increased erosion, flooding, and sediment deposition leads to habitat loss, water quality problems, and damage to utilities and infrastructure.

C. WATER RESOURCE ANALYSES

The Fairfax County Department of Public Works and Environmental Services (DPWES), Virginia Department of Environmental Quality (VDEQ), and other organizations and agencies regularly conduct water quality monitoring and testing. The Audubon Naturalist Society, the Northern Virginia Soil and Water Conservation District, and the Health Department Adopt-A-Stream program also provide volunteer data. DPWES continues to conduct comprehensive monitoring of Fairfax County streams. All of these data help provide a comprehensive understanding of the condition and health of Fairfax County's water resources.

1. Countywide Watershed and Stream Assessments

a. Stream Protection Strategy Baseline Study

The Stream Protection Strategy Baseline Study, published in 2001, continues to be a valuable data source, providing a holistic ecological assessment of county streams. The study provides information on fish taxa, benthic macroinvertebrates, general evaluation of watershed and stream features, and calculations of the percent impervious cover within each watershed.

In 2004, the county's strategy for biological assessment sampling was re-evaluated to establish long-term goals. To meet these goals, it was decided that in lieu of resampling the 20 to 25% of the baseline study monitoring sites on an annual basis, it would be more beneficial to infer annual countywide stream conditions and trends from a probability-based sampling procedure. Additionally, data from various volunteer biological monitoring activities (Northern Virginia Soil and Water Conservation District and Audubon Naturalist Society) would be used for site-specific trend evaluations. Additional information on volunteer monitoring programs will be provided later in this chapter.

The Stream Protection Strategy Baseline Study can be viewed online at:
http://www.fairfaxcounty.gov/dpwes/environmental/sps_main.htm.

2004 Update on Countywide Stream Assessment

Thirty sites were sampled for benthic macroinvertebrates and 14 sites were sampled for fish. Reference sites in Prince William Forest Park continue to be monitored on an annual basis**.** Results from the sampling indicated that three-quarters of the county's streams are in fair to poor condition.

Future sampling sites will continue to be randomly distributed throughout the county. Project specific monitoring will also occur as more and more stream restoration and low impact development (LID) projects are implemented throughout the county.

The 2004 report should be available on-line as data analysis is completed at:
http://www.fairfaxcounty.gov/gov/DPWES/environmental/SPS_Main.htm.

b. Countywide Stream Physical Assessment

In February 2004, the Stream Physical Assessment Study was completed, which will provide the majority of the field reconnaissance data for the county's watershed management plans. The study provides information on habitat conditions, impacts on streams, general stream characteristics, and geomorphic classification of stream type. Copies of the Countywide Stream Assessment may

be requested by contacting the Fairfax County Stormwater Planning Division at 703-324-5500.

c. Volunteer Water Quality Monitoring Programs

i. Northern Virginia Soil and Water Conservation District (NVSWCD)

The Northern Virginia Soil and Water Conservation District (NVSWCD) coordinates and manages a volunteer stream monitoring program in Fairfax County. The program includes training and certification of volunteer monitors, equipment, data management and analysis, and quality control. Four times a year, volunteers conduct biological and chemical monitoring and a habitat assessment, using the Save Our Streams protocol. Volunteers assess and evaluate water quality based on the type and diversity of benthic macroinvertebrates. Monitors conduct water chemistry tests for temperature, turbidity, and nitrates to assess the water quality. Observations of the surrounding watershed, including land uses, the amount of streamside and stream bank vegetation, tree canopy, erosion, and signs of other pollution are also evaluated. In 2004, there were 53 active sites.

The certified data are forwarded to Fairfax County, Virginia Department of Environmental Quality, Virginia Save Our Streams, and other interested organizations. This program helps supplement the county monitoring program.

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ii. Audubon Naturalist Society (ANS)

ANS also manages a volunteer water quality monitoring program in the region that currently includes 16 monitors in Fairfax County, with an average of four monitors for each of the four sites in Fairfax County. Two sites are in E. C. Lawrence Park and are monitored by Park staff. The ANS program uses a modified version of the EPA's Rapid Bioassessment II protocol, which includes assessment of in-stream and streamside habitat parameters and a survey of benthic macroinvertebrate populations. There are three required monitoring sessions (May, July, and September) and an optional winter monitoring session between December and February. ANS staff performs data entry and quality control activities. ANS also furnishes all monitoring equipment and training. Monitor training includes macroinvertebrate identification (order and family level), protocol practicum, habitat assessment, and benthic macroinvertebrate adaptations. Monitors are recruited in semi-annual introductory workshops. The water quality monitoring program is part of a larger watershed awareness program that includes slide show and video presentations, watershed walks, and other presentations.

iii. Fairfax County Park Authority

Site staff at Ellanor C. Lawrence Park have conducted stream studies (primarily of benthic macroinvertebrates) at Walney Creek, Big Rocky Run, and Courthouse Spring Branch four times per year.

Water quality monitoring at six stations within Huntley Meadows Park resumed in 2005.

2. Fairfax County Water Quality Monitoring

a. Bacteria Monitoring

In 2004, the Fairfax County Stormwater Planning Division (SWPD) took over the bacteria monitoring program, previously conducted by the County Health Department. Samples were taken to determine concentrations of fecal coliform bacteria. The 80 original sampling sites were divided into nine sections. Each section was sampled four times in 2004. In addition to measuring fecal coliform concentrations, *Escherichia coli*, or *E. coli*, concentrations were also measured based on the EPA recommendation to use *E. coli* levels to determine possible health concerns. *E. coli* bacteria are found in the intestinal tracts of warm-blooded animals, including humans, and therefore can be indicative of fecal contamination and the possible presence of a pathogenic organism. Over 300 samples were taken from 25 watersheds in 2004. SWPD also took samples to determine the levels of nitrates and phosphates as a secondary test for potential human inputs.

In 2004, SWPD began the use of Optical Brighteners Monitoring (OBM) to identify illicit waste discharges into the streams. A representative from the U.S. Environmental Protection Agency trained SWPD staff how to conduct OBM. OBM can be used in upper sections of a site's sub-watershed where streams regularly have high bacteria concentrations.

In 2003, the Department of Environmental Quality (DEQ) adopted a more stringent bacteria standard for primary contact recreation to all surface waters of the state. This action was taken as part of Virginia's commitment to attain the national goal of water quality of surface water for all types of recreation. According to these standards, the following standards now apply:

- Fecal coliform bacteria shall not exceed a geometric mean of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a calendar month.

- No more than 10 percent of the total samples taken during any calendar month can exceed 400 fecal coliform bacteria per 100 ml of water.

- *E. coli* shall not exceed a geometric mean of 126 bacteria per 100 ml of water or exceed an instantaneous value of 235 bacteria per 100 ml of water.

In 2004, 24 percent of fecal coliform samples taken by SWPD staff were in the acceptable water quality range (less than 200 f.c./100 ml of water). The 18-year average is 26 percent. The percentage of samples with fecal concentration less than 400 fc/100ml decreased to 28% in 2004 from 32% in 2002.

All sites where at least four samples were taken exceeded concentrations of 400 fc/100 ml at least once. The vast majority of sites (97%) exceeded 400 fc/100ml two or more times. This seems to indicate that there is a problem with fecal coliform contamination in both rural and urban areas of the county.

In additional to bacteria monitoring, SWPD staff also measured chemical parameters including pH, water temperature, nitrate nitrogen, phosphorus, dissolved oxygen, and specific conductance.

b. Dissolved Oxygen

The presence of dissolved oxygen (D.O.) is essential for aquatic life, and the type of aquatic community is dependent to large extent on the concentration of dissolved oxygen present. Dissolved oxygen standards are established to ensure the growth and propagation of aquatic ecosystems. The minimum Virginia state standard for dissolved oxygen is 4.0 mg/l.

Over 99% of the samples collected for determination of D.O. were above the 4.0 mg/l range. The sample below the acceptable level was recorded in September. The average D.O. measurement in 2004 was 10.80 mg/l.

c. Nitrate Nitrogen

Nitrate Nitrogen is usually the most prevalent form of nitrogen in water because it is the end product of aerobic decomposition of organic nitrogen. Nitrate from natural sources is attributed to the oxidation of nitrogen in the air by bacteria and to the decomposition of organic material in the soil. Fertilizers may add nitrate directly to water resources. Deposition of nitrogen compounds from air pollution also occurs. Nitrate concentrations can range from a few tenths to several hundred milligrams per liter. In non-polluted water, they seldom exceed 10 mg/l. Nitrate is a major component of human and animal wastes, and abnormally high concentrations suggest pollution from these sources.

The samples for nitrate nitrogen ranged from a low of 0.10 mg/l to a high of 4.61 mg/l. The average was 1.25 mg/l, well below the maximum contaminant level of 10 mg/l. This is higher than the average of the prior year's sampling results of 0.5 mg/l.

d. Phosphorus (Total)

Phosphorus is found in natural water in the form of various types of phosphates. Organic phosphates are formed in the natural biological process--by organisms existing in the water, contributed to sewage in body wastes and food residues, and/or formed in the biological treatment process for sewage. Condensed phosphates and orthophosphates are found in treated wastewater, laundry detergent, commercial cleansing compounds, and fertilizers. Phosphorus is essential to the growth of organisms and is usually the nutrient that limits growth of organisms in a body of water. Therefore, the discharge of raw or treated sewage, agricultural drainage, or certain industrial wastes may stimulate nuisance quantities of photosynthetic aquatic organisms and bacteria.

There is no established limit for phosphorus in stream water. The average phosphorus measurement was 0.11 mg/l. This year's average does not indicate a significant increase over the prior year's average.

e. Temperature

The existence and composition of an aquatic community also depends greatly on the temperature characteristics of a body of water. The maximum standard for free flowing streams is 89.9^{o} F (32^{o} C).

The temperature range for all stream water samples was –0.23° C for the low in February and 27.0° C for the high in September. The average temperature was 12.98° C.

f. pH

Stream pH is an important factor in aquatic systems. The pH range of 6.0 – 9.0 generally provides adequate protection of aquatic life and for recreational use of streams.

The pH ranged from a low reading of 5.95 to a high of 8.87 for all samples. Five samples were above the 8.5 limit and one sample was below the 6.0 limit.

Data from the 2004 sampling will be available in the SWPD Comprehensive Monitoring Report in 2005.

3. Virginia Department of Environmental Quality (DEQ)

The DEQ performs long-term trend monitoring at 14 streams that are either in Fairfax County or border the county. Additionally, DEQ has eight monitoring stations in the county. Monitoring began in July, 2004 and will continue for two years. DEQ will be doing biological monitoring at four stations in the county. Failure to meet designated

water quality standards may result in a stream being placed on the 303(d) list for impaired state waters.

a. Occoquan River and Basin Management

The Occoquan River straddles the southern border of Fairfax County and the northern border of Prince William County. The River has been dammed near the town of Occoquan. The Occoquan Reservoir, created by the damming, serves as one of two primary sources of drinking water for Fairfax Water (formerly the Fairfax County Water Authority), which operates a facility and withdraws water from the Reservoir. Because of its use as drinking water, water quality in the Reservoir is highly monitored and water from sewage treatment plants entering the Reservoir is highly treated.

i. Upper Occoquan Sewage Authority (UOSA)

The following information has been excerpted directly from information provided by UOSA:

UOSA operates an advanced water reclamation facility in Centerville, Virginia and serves the western portions of Fairfax and Prince William Counties, as well as the Cities of Manassas and Manassas Park. The water reclamation plant includes primary-secondary treatment followed by advanced waste treatment processes: chemical clarification, two-stage recarbonation with intermediate settling, multimedia filtration, granular activated carbon adsorption, chlorination for disinfection, and dechlorination. The plant's rated capacity is 54 million gallons a day (mgd) as of January, 2005 following the 2004 substantial completion of UOSA's expansion to that capacity.

UOSA operates under a Virginia Pollutant Discharge Elimination System (VPDES) Permit, which is issued by the Department of Environmental Quality (DEQ). The permit limits and 2004 plant performance are listed in Table III-1**.**

Table III-1. UOSA Permit Requirements and 2004 Performance

Parameter	**Limit**	**Performance**
Flow	32 mgd	27.2 mgd
Chemical oxygen demand	10.0 mg/l	<5.0 mg/l
Turbidity	0.5 NTU	<0.1 NTU
Total Suspended Solids	1.0 mg/l	<0.1 mg/l
Total Phosphorus	0.1 mg/l	0.05 mg/l
Surfactants	0.1 mg/l	<0.01 mg/l
Total Kjeldahl Nitrogen	1.0 mg/l	0.10 mg/l
Disinfection Minimum Chlorine Residual	0.6 mg/l	0.77 mg/l
Dechlorination Chlorine Residual (mg/l)	Non detect	Non detect

Source: Upper Occoquan Sewage Authority

In 2004, the maximum influent 30-day average flow of 29.9 mgd. The influent highest rolling 30-day flow was observed during the 30-day rolling period ending on January 4, 2004 at 35.92 mgd. The UOSA Plant continues to produce high quality reclaimed water.

UOSA produces and treats two types of residuals: biosolids from conventional treatment and lime solids from chemical treatment. Anaerobic digestion decomposes the biosolids to relatively stable compounds. In addition to anaerobically digesting the biosolids, in 2004 UOSA commended the operation of its rotary pelletizer dryer and is producing Exceptional Quality (EQ) biosolids. EQ biosolids have commercial potential in the direct agricultural market.

Thickened lime residuals are gravity thickened and dewatered on the recessed chamber filter presses. All lime solids are landfilled on site in a permitted industrial landfill.

ii. Occoquan Watershed Monitoring Laboratory (OWML)

The Occoquan Watershed Monitoring Program (OWMP) is administered by the OWML and has been in operation since 1972. It is funded by Fairfax Water and the six jurisdictions within the watershed: Fairfax, Prince William, Loudoun, and Fauquier Counties; and the Cities of Manassas and Manassas Park. The program consists of nine (9) stream monitoring stations (automated flow monitoring at all and storm sampling at most) and four (4) Occoquan Reservoir stations. Base flow sampling in the streams and all sampling in the Reservoir is done manually. In addition to surface and bottom water samples, profiles of DO, temperature and pH are also obtained at the Reservoir stations. Sampling is done weekly during the growing seasons and biweekly or monthly (if ice is present) in winter. The water quality data that have been provided in past years indicate little change in water quality in the watershed. The Lake Manassas program is used for monitoring water and sediment at seven (7) stream stations and eight (8) lake stations. The eutrophication status of the Occoquan Reservoir and Lake Manassas were within the same range as before--moderately eutrophic but holding steady.

The OWML monitors quarterly for organic synthetic organic compounds (SOCs) in the watershed in a program established under the recommendation of EQAC in 1982 for water samples. In 1988, the OWML began monitoring sediment and fish samples within the reservoir for SOCs. The Lake Manassas program also funds monitoring of SOCs at its stations. The most frequently detected SOC is Atrazine, usually detected in springtime and early summer when it is being land applied. Concentrations “are usually lower” than the maximum contaminant level (MCL) of three micrograms/liter for drinking water. The pesticide Dual (metolachor) and phthalates are regularly found in concentrations one or more order of magnitude below the MCL.

No sampling results were available for 2004 or 2005.

b. Noman M. Cole Jr. Pollution Control Plant (NMCPCP)

The NMCPCP, located in Lorton, is a 54 million gallon per day (mgd) advanced wastewater treatment facility that incorporates preliminary, primary, secondary, and tertiary treatment processes to remove pollutants from wastewater generated by residences and businesses in Fairfax County. The original plant, which began operation in 1970 at a treatment capacity of 18 million gallons a day (mgd), has undergone two capacity and process upgrades to meet more stringent water quality standards. After treatment, the wastewater is discharged into Pohick Creek, a tributary of Gunston Cove and the Potomac River. The plant operates under a VPDES permit. The plant is required to meet effluent discharge quality limits established by the Virginia Department of Environmental Quality (DEQ). Table III-2 presents the facility's performance and current effluent monthly limitations.

Table III-2
NMCPCP Permit Requirements and 2004 Performance Averages

Parameter	Limit	Performance
Flow	54 mgd	41.91 mgd
$CBOD_5$	5 mg/l	< 2 mg/l
Suspended Solids	6 mg/l	1.9 mg/l
Total Phosphorus	0.18 mg/l	<0.06 mg/l
Chlorine Residual	0.008 mg/l	0.008 mg/l
Dissolved Oxygen	6.0 mg/l (minimum)	9.0 mg/l
pH	6.0-9.0 (range)	7.1
E. coli Bacteria	126/100mls*	< 1/100mls*
Total Nitrogen	No Limit	< 6.2 mg/l

Source: Department of Public Works and Environmental Services
*Geometric mean

Construction to expand the plant treatment capacity to 67 mgd began in 1997 and was completed in July, 2005. This includes process upgrades to remove ammonia to less than one mg/l and total nitrogen to less than eight mg/l in order to meet Virginia Water Quality Standards and the Chesapeake Bay Program goals for total nitrogen. Also included in the project are: flow equalization tanks, a new/upgraded laboratory for water quality testing, upgraded odor control systems, new instrumentation and control systems, and a new septage receiving facility.

In 2004, 56,584 wet tons of sludge were generated and incinerated.

In August, 2004, the Virginia Secretary of Natural Resources announced proposed changes to nutrient discharge limits for sewage treatment facilities in Virginia's portion of the Chesapeake Bay watershed. These proposed changes will limit nutrient discharges from the NMCPCP and require substantial modifications.

4. Individual Stream Reports and Programs

a. TMDLs (Total Maximum Daily Loads)

A total of 19 water bodies with drainage areas in Fairfax County are included in Virginia's listing of impaired waters for 2004. Of the listed waterbodies, 12 are riverine systems totaling 58.45 miles, six are estuarine with a total area of 23.23 square miles, and one is a drinking water reservoir (Occoquan) with an area of 1,700 acres. Ten of the 17 waterbodies are multijurisdictional. The cause of the impairment for the majority of riverine systems is either fecal coliform or declining populations of benthic macroinvertebrates. For the estuarine waterbodies, the cause of impairment for the majority is fecal coliforms and/or PCBs in fish tissue. According to the schedule, seven water bodies require TMDL studies to be completed by 2010, nine by 2014, and three by 2016. Popes Head Creek and Bull Run TMDLs are to be developed by 2006, and TMDLs for the lower section of Accotink Creek and for Difficult Run are to be developed by 2008.

i. Accotink Creek TMDL

Due to excessive fecal coliform bacteria counts, a 4.5 mile segment of Accotink Creek in Fairfax County, beginning at the confluence of Crook Branch and Accotink Creek to the start of Lake Accotink, was placed on the 1998 Virginia 303(d) TMDL (Total Maximum Daily Load) list. A TMDL is a highly structured, watershed-specific plan for bringing an impaired waterbody into compliance with the Clean Water Act goals. A two-year study began in December, 1998, headed by the U.S. Geological Survey, in partnership with the Virginia Department of Conservation and Recreation (DCR), the Virginia Department of Environmental Quality (DEQ), and Fairfax County. The initial study was completed in fall, 2001. The sample collection and analysis, which began in April, 1999, to determine the "type" of fecal coliform bacteria found in streams is now complete. Results of this analysis are discussed in Chapter VII of this report, with Figure VII-2-1 (see page 226) presenting a breakdown of sources of fecal coliform bacteria. The most significant identified sources were geese, humans, and dogs, with ducks, cats, seagulls, raccoons, rodents, cattle, and deer also identified as sources. A draft TMDL has been published by the Virginia Department of Environmental Quality. The draft TMDL includes a goal to reduce the human sources of fecal coliform bacteria by 99%. A study by USGS initiated in the August of 2001 will identify and isolate the specific sources of human fecal coliform bacteria. The study will be conducted over a three-year period. During 2002, an extensive Dry Weather Screening program

was undertaken in the Accotink Creek Watershed as part of the ongoing efforts to detect illicit connections and improper discharges. In 2003, due to large amounts of rain, scheduling sampling campaigns became extremely difficult. Only one in April was completed. To date, five sampling campaigns of the eight planned have been completed. Throughout the final campaigns, there will be continued focus on storm drains that flow during dry periods and sampling of locations with elevated fecal coliform bacteria levels. The USGS paper on sampling Accotink Creek can be viewed on-line at:
http://water.usgs.gov/pubs/wri/wri034160/wrir03-4160.htm.

The field investigation portion of a 3-year follow up study was USGS on sources of human waste being discharged into Accotink Creek was completed. The results are being complied and will be used to identify "hot-spots" for remedial work and inclusion in the TMDL implementation plan.

ii. Four Mile Run TMDL and the Four Mile Run Program

Although only the very upper reaches of Four Mile Run occur in Fairfax County, it is important to note the existence of a TMDL for Four Mile Run and the participation of Fairfax County in the Four Mile Run Program.

The Four Mile Run Program is the oldest continually active program of the Northern Virginia Regional Commission (NVRC). The four jurisdictions (Arlington County, Fairfax County, the City of Falls Church and City of Alexandria) through which Four Mile Run flows are involved in the program. The program was founded in 1977 to ensure that future development would not result in increased flooding in the watershed. Today, all development and redevelopment is analyzed through the Four Mile Run Computer Model to determine whether on-site detention of stormwater runoff is necessary to prevent downstream flooding. In 1998, the Four Mile Run Agreement was amended to address urban water quality issues in addition to flooding.

The Four Mile Run Fecal Coliform Study to determine the sources of fecal coliform bacteria in the watershed using DNA was completed in 2000. The study found that waterfowl contribute over one-third (31%) of that bacteria that could be matched. Eighteen percent of the bacteria originated from humans, 13% from dogs, 6% from deer, 19% from raccoons, and 13% from other sources. Bacteria from humans appear to be highly localized. There were indications in that, without regard to specific host animals, E. coli bacteria seem to regrow, through cloning, within the storm drains and stream sediments, which in turn perpetuates bacteria levels. Efforts are underway to study this hypothesis.

NVRC was given a grant from the Virginia Department of Environmental Quality (DEQ) for the development of a TMDL (Total Maximum Daily Load) for bacteria in Four Mile Run, which was approved by the EPA on May 31,

2002. The draft implementation plan was presented for public comment on December 10, 2003; its focus is on the reductions of fecal coliform bacteria from human and canine sources by 98 percent. The plan was finalized on December 20, 2003 and can be viewed on-line at:
www.novaregion.org/bacteriaimplementation.htm

Fairfax County completed a list of actions required by the Four Mile Run Implementation Plan. The progress made toward obtaining water quality standards will be assessed in five year increments.

iii. Bull Run and Popes Head Creek TMDL

NVRC has been approached by the Virginia Department of Environmental Quality concerning the development of TMDLs for impaired streams in the Occoquan watershed. The first two will be for streams outside Fairfax County, Licking Run and Cedar Run. However a TMDL addressing degradation of the streams' benthic communities is scheduled to be completed for Bull Run and Popes Heads Creek in Fairfax by 2008.

b. Kingstowne Stream Restoration Project

In 1998, Fairfax County, the Northern Virginia Soil and Water Conservation District, the U.S. Natural Resources Conservation Service, and two citizens groups (the Friends of Huntley Meadows and the Citizens Alliance to Save Huntley) formed a partnership to restore a stream in the Kingstowne area of the county. The Kingstowne stream is a tributary of Dogue Creek and is upstream of Huntley Meadows Park. Started in October and finished by December, 1999, the Kingstowne Stream Restoration Project is now functional. The project used natural principles of geomorphology and soil bioengineering to create gentle meanders that slow the velocity of flow, and used natural vegetation to stabilize the stream banks. Testing has substantiated that erosion has been brought under control and water quality downstream is improved. During 2004, 20 storm event samples and 12 base flow samples were collected and analyzed to determine pollutant loads in Dogue Creek. Based on the monitoring data, the sediment removal efficiencies were achieved for all storm events. The phosphorus removal rate did not meet permit requirements of 50% removal so DPWES is working with the Army Corps of Engineers to resolve the problem. The NVSWCD continues to monitor the project, which continues to improve bank and floodplain stability**.**

c. Gunston Cove Aquatic Monitoring Program

Gunston Cove is the site of the outfall of Fairfax County's Noman M. Cole, Jr. Pollution Control Plant. The primary objective of this George Mason University program is to determine the status of the ecological communities and physical-chemical environment in the Gunston Cove area of the tidal Potomac for evaluation of long-term trends. This should provide the basis for well-grounded management

strategies to improve water quality and biotic resources in the tidal Potomac. It was recommended in this final report that long term monitoring should continue.

Water quality has generally improved since the 1980s. Long-term trends were examined for a wide range of water quality and biological parameters. The analysis of water quality parameters focused on growing season values (June to September). Both LOWESS (locally weighted sum of squares) trend lines and linear regressions were examined to allow detection of long-term trends. In the cove, chlorophyll a, a photosynthetic rate, biochemical oxygen demand (BOD), volatile suspended solids (VSS), total phosphorus, and organic nitrogen had significant regression coefficients indicating a net decrease over the study period (1983/4-2003). Nitrate nitrogen and total suspended solids (TSS) have also exhibited significant declines over the whole study period. Ammonia nitrogen has clearly declined since 1989. These results are consistent with a significant decline in phytoplankton biomass in the cove over the study period. Phytoplankton cell densities have also declined in the past two years. Secchi disc, a measure of water clarity, has demonstrated a steady and significant increase due to lower chlorophyll a and TSS. Water clarity is improving to the point that light levels in the cove are becoming more suitable for submerged aquatic vegetation (SAV).

Algae concentrations are at lower levels than in the mid 1980s, probably due to lower phosphorus levels in the water, and zooplankton (microscopic "animals' found in surface waters) levels have increased. Benthic (bottom dwelling) organism levels are greater in the river channel than in the cove.

In the cove in 2002, white perch has remained dominant at steady levels over the period, suggesting a supportive environment. Bay anchovy and blueback herring comprised a significant percentage of the total trawl catch. Banded killifish dominated the seine collection and may reflect an increase in habitat as submerged aquatic vegetation has increased in the cove. Water quality in Pohick Creek remains good enough to support spawning alewife and gizzard shad.

The report suggests goals to reduce man-made stresses that we can, and reduce or manage those we cannot, eliminate. Specific management practices to control point and nonpoint sources, protect and enhance stream buffers and tidal wetlands, and avoid further exotic species introductions are recommended. Continuation of the monitoring program to assess effective management is also recommended. The 20-year record of data from Gunston Cove and the nearby Potomac River is starting to reveal many interesting long-term trends that will aid in the continued management of the watershed and point source inputs.

d. Wetlands Mitigation Monitoring

The Virginia Department of Transportation is currently monitoring three wetland mitigation projects, one between Dranesville Road and Sugarland Run in Dranesville District, one near Roberts Parkway Overpass and Virginia Railway

Express-Burke station in Braddock District, and one at Lee Highway and Big Rocky Run in Sully District. These sites were created to mitigate impacts from the construction of the Fairfax County Parkway, Roberts Parkway Bridge Overpass, the Springfield Interchange, and the Route 29 bridge replacement over Big Rocky Run. All sites require five-year success monitoring. The Braddock site was just planted in 2003 and the Dranesville site has been monitored for two years. The results at all three sites have been impressive with each site fulfilling success criteria outlined in the water quality permits. These sites provide a water quality benefit in these watersheds as well as habitat for a host of amphibians, birds and mammals.

e. Illicit and Potential Hazardous Material Discharges

In calendar year 2004, the Hazardous Materials and Investigative Services Section of the Fairfax County Fire and Rescue Department responded to reports involving 29 improper disposals of various hazardous materials and solid waste, nine pipeline incidents, 280 petroleum product releases, and 67 various other types of product release. In 36 cases, storm drains and creeks/streams were directly contaminated. Major incidents for 2004 included 275 gallons of off-road diesel fuel being discharged into the Potomac River and 275 gallons of waste motor oil being discharged into Tripps Run and Lake Barcroft.

f. Investigations of Contamination caused by Leaking Underground Storage Tanks

In 2004, there were 132 reported incidents investigated by the Virginia Department of Environmental Quality, of which 36 remain open for ongoing scrutiny. As of June, 2005, there were a total number of 2,101 cases, of which 157 remain open.

D. PONDS AND LAKES

All ponds and lakes in Fairfax County are man-made by excavation and/or the damming of streams. These open water impoundments have their own aquatic communities and have many of the same organisms as streams. Most provide recreational opportunities for humans. Due to increased runoff in more urbanized areas, they are often subject to heavy sediment and nutrient loads. Heavy sedimentation means that most of the lakes have to be dredged on a regular basis in order to maintain pond or lake depth. Heavy nutrient loads result in large algal and plant blooms over the warmer months of the year.

1. Reston Lakes

The Reston Association (RA), the homeowners association for the large, planned community of Reston (population > 60,000), has an active watershed and lakes management program that focuses on the monitoring and improvement of water quality. RA manages and monitors four lakes, Audubon, Anne, Thoreau, and Newport, and two ponds, Bright and Butler.

a. Management Initiatives

RA is actively involved in public education and innovative approaches to erosion and drainage control. Examples of watershed management practices in Reston include: water quality monitoring; stream bank and shoreline stabilization; erosion abatement; fisheries monitoring; SAV planting; algae and invasive aquatic weed control; waterfowl management; trash removal; dredging; and riparian buffer restoration.

In 2004, RA worked with several clusters and individual homeowners and conducted several shoreline stabilization projects using biologs, erosion cloth, and native plantings. RA continues to promote natural shoreline stabilization and encourages the use of more environmentally sensitive materials for docks such as recycled plastic materials as opposed to conventional pressure-treated timber.

RA continued its Canada goose management initiatives in an effort to control the population on its lakes. In 2004, 27 goose nests were located and mapped and 58 eggs were addled.

RA continued to work with Northern Virginia Stream Restoration, L.C., (NVSR) to help coordinate and establish the Reston stream mitigation bank. The project will implement the recommended stream restoration projects outlined in the Reston Watershed Management Plan. A team of regulatory agencies, including the US Army Corps of Engineers, the US Environmental Protection Agency, the US Fish & Wildlife Service and the Virginia Department of Environmental Quality, will oversee the progress of the bank.

Volunteers and RA staff monitor Reston's streams four times a year using the Virginia Save Our Streams protocol. In 2004, data were collected at eleven volunteer stream monitoring sites. RA works closely with the Northern Virginia Soil and Water Conservation District program and co-hosted an Introductory Stream Monitoring Workshop in February, 2004.

RA revised and completed the *Understanding, Preserving, and Enjoying Reston's Lakes and Streams* booklet (second edition). RA also produced and printed the *Help Our Watersheds – Living in the Potomac and Chesapeake Watershed* brochure to help educate residents about simple things they could do to control runoff, prevent and manage erosion, and help Reston's water resources. Funding for the brochure was made possible by a grant from the Chesapeake Bay license plate fund. The brochure has been distributed via mailings, at festivals, and in posted brochure boxes along pathways; the brochure is also included in welcome packets to new residents.

b. Monitoring and Results

Reston's lakes are monitored six times per year (April through September) by a lake management consultant. RA has been monitoring water quality in its lakes since 1981; Lake Newport was added to the monitoring program in 1992. Each month (April through September), dissolved oxygen, dissolved oxygen saturation, temperature, pH, conductivity, total phosphorus, Secchi depth transparency, chlorophyll a, phytoplankton, and zooplankton are measured. Fecal coliform and *E. coli* testing were conducted in Lake Audubon for a second year in preparation for annual swimming events. Reston's lakes' primary issues continue to be accelerated sedimentation, algae blooms, loss of oxygen throughout the water column, trash, and nuisance invasive vegetation.

The following summary is from the 2004 Reston Lakes Annual Monitoring Report prepared by Bill Kirkpatrick and Kevin Laite with Aquatic Environment Consultants, Inc.:

i. Lake Anne

The aeration system continued to help reduce dissolved oxygen depletion. There was no change in temperature from the surface to the bottom of the lake, therefore there was no thermocline present this season. The pH levels were higher than last season; the average was 7.1. Conductivity levels were below average. The average Secchi depth of one meter was the lowest to date and well below the long-term average. Reduced water clarity was the result of large, nuisance green and green-blue algae blooms, which plagued the lake during most of the season. The seasonal average for chlorophyll a was the highest on record. Phosphorus levels followed the chlorophyll trend. Zooplankton density remained low and was well below the long-term average.

ii. Lake Audubon

The lake showed signs of thermal and oxygen stratification in April. Water temperatures were below average. Dissolved oxygen levels in the bottom portion of the lake were above average. The pH levels were higher than average and the conductivity levels were lower than average. Secchi depth was 1.6 meters, still below the long-term average of 1.8 meters. Chlorophyll a levels were record high for the third year in a row. Blue-green algae blooms were present July through September. Zooplankton populations were exceedingly low and well below average. Lack of spring blooms and suppression of phytoplankton dramatically impacted zooplankton populations.

iii. Lake Thoreau

Thermal and oxygen stratification occurred by early May. Overall the oxygen levels in the lake were the highest of all of the Reston lakes. Water temperatures were slightly above average. The pH levels were up from 2003 but still below average. Conductivity levels continue to be above the long-term average. The average Secchi depth was 2.8 meters was deeper than recent years. Water clarity continues to be the best of all the lakes. The seasonal average chlorophyll concentration was above average with a large golden-brown algae bloom occurring in April. As with the other lakes, zooplankton populations were exceedingly low. The density was the second lowest since 1991.

iv. Lake Newport

As with the other lakes, thermal and oxygen stratification occurred early in the season, although the lake did not stratify quite as shallow as it has in the past. Dissolved oxygen levels did show improvement this year. The pH levels were higher than last season. Conductivity levels were also higher. Water clarity remained the same as last year's record low. Blue-green and golden-brown algae blooms plagued the lake throughout the season resulting in low Secchi depth measurements. Chlorophyll levels continued to be higher than average. There was a large bloom in July, which impacted water clarity. Zooplankton populations peaked in May but were still exceedingly low as consistent with the other lakes.

2. Pohick Watershed Lakes

The six Pohick watershed lakes (Barton, Braddock, Huntsman, Mercer, Royal, and Woodglen) are inspected annually for dam structure but are not monitored for biological or chemical parameters.

3. Lake Barcroft

The Lake Barcroft Watershed Improvement District (WID) is a local taxing district authorized by Virginia Law for conservation purposes. In 1999, Lake Barcroft had about 15,000 cubic yards of dredge spoil from the lake to dispose of. In order to avoid the costs associated with hauling it to a landfill, they rented a huge topsoil screening machine and excavator to load it, converting the waste material into topsoil by filtering out all the sticks, stones, beverage cans and other debris. The topsoil was then made available to local residents for a modest delivery fee. Some innovative BMPs (Best Management Practices), such as flow regulators, check dams, a diversion debris trap, a stormwater injection pit, and street sweeping program have been implemented by the WID. These BMPs are being studied for both their capacity to reduce pollution and improving water quality in the lake and its tributaries, possibly leading to countywide

implementation. The WID also has a program to purchase and distribute high quality lawn fertilizer (that has been formulated without phosphorus) in 50-pound bags and sell it to homeowners. The WID also did a fish flesh study by sending edible portions of fish removed for analysis of toxins and heavy metals. Fish studied were Largemouth Bass, Bluegill, and Black Crappie. None of the counts were over EPA warning levels. The WID is planning its next large-scale dredging event (approximately 12,000 cubic yards) for 2006; however, there are concerns with the lack of nearby disposal areas to reduce dredge disposal costs.

4. Lake Accotink

Lake Accotink is owned and managed by the Fairfax County Park Authority. County government has authorized the expenditure of $6,000,000 to dredge and remove 200,000 cubic yards of sediment from the lake. The Fairfax County Park Authority provides a boat and operator to the Fairfax County Health Department, which conducts water quality tests from four surface points from May through August. Results from the sampling were within the required limits as mentioned in the Health Department Stream Report. This sampling will now be part of the DPWES monitoring program.

5. Other Ponds and Lakes

There are other significantly sized private and public lakes within the county. Many are centered within developments and have dwellings built along the banks of the lakes. There are also numerous smaller ponds throughout the county that are found within communities, commercial developments or on farm properties. Some are associated with golf courses and many serve as stormwater management ponds.

E. STORMWATER MANAGEMENT

1. Status of a Dedicated Stormwater Utility Concept in Fairfax County

In December, 1998, a draft report by the Stormwater Utility Advisory Group (SUAG) to the Board of Supervisors was circulated for review. The report addressed several issues relating to the implementation of a stormwater service charge program for Fairfax County. Activities were suspended leading up to the fall, 1999 Board of Supervisors elections. During the summer of 1999, the firm of Camp, Dresser and McKee (CDM) was requested to develop a concept paper/report on framing significant aspects of the county's existing stormwater control program and present ideas and recommendations on the essential elements of future stormwater program. In 2004, Fairfax County, with assistance from a consulting firm, developed a Watershed Community Needs Assessment and Funding Options Study to address the strategies for developing a comprehensive stormwater management program and a dedicated funding mechanism to support it. During the 2005 budget proposal hearing, the county set aside a penny of every dollar of the real estate tax, which equates to $17.9 million, to be dedicated to stream restoration and protection programs. This will take the place of the stormwater utility in the near future.

2. Status of NPDES Requirements

The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Permit (MS4), a five year permit, was reissued by the Virginia Department of Environmental Quality (DEQ) in January, 2002. Total Maximum Daily Loads (TMDLs) are tied into the new permit. The Stormwater Planning Division and the Maintenance and Stormwater Management Division incorporated into the new permit a more comprehensive stormwater management program. This program includes the comprehensive Watershed Management Planning effort and long term biological monitoring, infrastructure mapping, inspections and maintenance, retrofitting developed areas with water quality control facilities, and more rigorous public outreach and education. The Maintenance and Stormwater Management Division of DPWES will perform inspection of privately owned stormwater management facilities on a regular basis (every five years). Water quality will be monitored at six storm sewer outfalls four times per year (seasonally), and 100 outfalls per year will be monitored during dry weather to determine the presence of illicit discharges.

During 2004, the county continued to evaluate BMPs (best management practices), undertook ten stormwater management ponds, continued with the monitoring of dry weather outfalls, and inspected over 1,600 stormwater control facilities.

The 2004 Annual MS4 Report was submitted by the county and accepted by the Virginia Department of Environmental Quality.

3. Regional Stormwater Management Program

a. Background

Since the early 1980s, the county's *Public Facilities Manual* (PFM) has included a provision that encourages the concept of regional stormwater management. As opportunities arose, major developers as well as county staff pursued regional stormwater management primarily through the development process. An overall plan identifying the most appropriate locations for regional facilities was needed to improve this process.

In January 1989, the Board of Supervisors adopted a plan prepared by the engineering firm of Camp, Dresser and McKee. The plan, intended to be a pilot program, consists of a network of 134 detention facilities that will directly control 35 square miles of drainage area. To date, over 46 regional ponds in the Regional Stormwater Management Plan have been constructed. Currently, there are 28 facilities in various stages of implementation. Eighteen potential facilities are in the final design phase, either as county-managed projects or via developers through rezoning commitments. Five regional pond facilities are currently in the bonding or construction phase.

This Stormwater Management Plan has been reevaluated, and recommendations for change have been made, by the Regional Pond Subcommittee, which is an ad hoc subcommittee of the Fairfax County Environmental Coordinating Committee. The Department of Public Works and Environmental Services is responsible for chairing and the work production of the Subcommittee. The Board of Supervisors tasked this Subcommittee on January 28, 2002 to examine the role of regional ponds as well as other alternative types of stormwater controls as watershed management tools. Public meetings (attended by over 100 people) were held in late 2002, and the report was submitted to, and subsequently accepted by, the Board of Supervisors. The Subcommittee identified 61 recommendations to improve Fairfax County's stormwater management program and to clarify the role of regional ponds in that program. The general consensus is that regional ponds do play a part in the county's stormwater management program, but their size and usage can be reduced by the use of better site designs and low impact development practices. The Subcommittee is currently coordinating the development of an implementation plan for all 61 recommendations, including a timeline and defined agency roles and assignments. This new plan, when implemented, should facilitate the merging of stormwater management goals within the watershed protection and restoration goals and should allow for the use of more innovative low-impact development and stormwater management techniques in Fairfax County.

The Subcommittee is currently suspended after an attempt was made to consolidate the recommendations into broader categories and action plans. A number of the recommendations are being addressed within the watershed management plan development along with efforts to modify the PFM to include Low Impact Development (LID).

c. County Mowing Policy at Stormwater Management Ponds

During the summer of 2000, in support of the interim tree policy adopted by the Board of Supervisors in 1999, the county revised the pond-mowing program. The interim tree policy provides opportunities for planting trees beyond the areas currently allowed under the Public Facilities Manual. The mowing program reduces the area mowed in and around a stormwater management pond by an average of 60% per pond.

d. Stormwater Pond Retrofit to Shallow Marsh Wetlands

The Maintenance and Stormwater Management Division of DPWES has noted the following: In 2004, four stormwater ponds that are maintained by the county, serving a total of 72 drainage acres, were retrofitted with shallow marsh wetlands in the pond floors. To date there are 1,051 dry-ponds in the county and less than 451 provide water pollution treatment. That leaves nearly 600 existing dry ponds which could potentially be retrofitted for pollution treatment. Of the 451 ponds that currently provide water quality treatment, there are a sizeable number that could be modified with new technologies to enhance their treatment capacities. To date, over

55 ponds have been planted. It is estimated that approximately eight to ten additional ponds will be planted this year.

4. Stormwater Treatment Facilities in Fairfax County

Fairfax County has various types of stormwater treatment facilities. Dry ponds are designed to fill up with water during a storm but return to a "dry" state within a few hours or a few days depending on their functional requirements. Wet ponds contain water year-round. The county maintains 1,127 stormwater management facilities, including 995 on-site dry ponds, 38 regional ponds, 47 underground chambers, 33 percolation trenches, five regional wet ponds, six bioretention areas, and two manufactured BMPs. In 2004, the county inspected each facility at least once, mowed 530 dam embankments, and performed 291 maintenance work orders.

There are 2,230 privately maintained facilities in the county: 282 wet ponds; 460 dry ponds; 114 sand filters; 52 manufactured BMPs; 336 percolation trenches; 554 roof top detention areas; 46 parking lot detention areas; 380 underground detention facilities; and six bio-retention areas. These facilities are inspected once every five years. A total of 457 (20%) such facilities were inspected in 2004.

5. Infill and Residential Development Study

The combination of development patterns in the county and a growing concern over water quality issues led to the May, 1999 request from the Board of Supervisors for the "Infill and Residential Development Study." The study was completed and released to the public in 2000. The Board of Supervisors accepted the final recommendations on January 22, 2001. The Study staff has reviewed the effectiveness of current policies regarding erosion control and storm drainage with the dual goals of minimizing any impacts of stormwater runoff from a proposed development on downstream property and limiting the impacts of stormwater management facilities on a neighborhood. Recommendations include:

1) An enhanced erosion and sediment control program, including the revoking of land disturbing permits during egregious violations;
2) Allowance of the use of chemical erosion prevention products and bonded fiber matrix on highly sensitive soils or on steep slopes;
3) Adoption of innovative BMPs;
4) Amendment of the Public Facility Manual to include Super Silt Fence requirements, Storm Drain Inlet Protection Devices, and Faircloth Skimmers;
5) Improved requirements for early review of stormwater management facilities as part of the rezoning process;
6) Improved requirements for evaluating the adequacy of stream channels for increased runoff due to new developments;
7) Development of a BMP monitoring program; and
8) Enhanced education programs for citizens, staff, and industry regarding E&S control.

Actions in 2002 to fulfill the recommendations included the following:

1) Development of an alternative inspection program has been completed and approved by the Virginia State Soil and Water Conservation Board in December of 2002.
2) Changes in improved siltation and erosion control amendments in the PFM now include Super Silt Fences and the start of the approval process for including Faircloth Floating Skimmers.
3) A Study concerning the impact of extended detention of the one-year storm was started in January, 2002.

Implementation of the recommendations continues. In 2004 significant progress was made towards the fulfillment of the stormwater and erosion and sedimentation (E&S) control initiatives. It is anticipated that the proposed Adequate Outfall Public Facilities Manual amendments will be finalized in 2005.

F. NONPOINT SOURCE POLLUTION PROGRAMS

1. Chesapeake Bay Program and Agreements

The Chesapeake Bay Program (CBP) is a cooperative arrangement among three states (Virginia, Pennsylvania, and Maryland), the District of Columbia, and the Federal government (represented by the Environmental Protection Agency) for addressing the protection and restoration of the water quality, habitats, and living resources of the Chesapeake Bay and its tributaries. These commitments are not legally binding. Each state determines how it will meet the various commitments, and the approaches to implementation often vary greatly among states. All streams in Fairfax County are tributaries of the Potomac River, which flows into the Chesapeake Bay. Three Chesapeake Bay Agreements have been signed, focusing on reducing pollutants in the Bay and its tributaries**.**

2. The Virginia Chesapeake Bay Preservation Act and Regulations

The Virginia Chesapeake Bay Preservation Act was passed as part of Virginia's commitment to the second Chesapeake Bay Agreement goals to reduce nonpoint source phosphorus and nitrogen entering the Bay. Pursuant to the requirements of the Chesapeake Bay Preservation Act and Regulations, the Division of Chesapeake Bay Local Assistance (CBLA, formerly the Chesapeake Bay Local Assistance Department, or CBLAD) and the Chesapeake Bay Local Assistance Board (CBLAB) have reviewed Fairfax County's Comprehensive Plan for consistency with the Act and Regulations.

On March 19, 2001 CBLAB determined that Fairfax County's Phase II (Comprehensive Plan) program was consistent with the Chesapeake Bay Preservation

Act and Regulations, subject to the condition that the County undertake and complete recommendations addressing the following:

- The incorporation of the adopted map of Chesapeake Bay Preservation Areas into the Comprehensive Plan;
- The identification of conditions along the County's tidal shoreline as they relate to erosion;
- The development of policies and implementation strategies to assist the County's Wetlands Board in its review of shoreline erosion control proposals;
- The identification of waterfront access points;
- The development of policies to establish criteria for locating boating access sites;
- The identification of water pollution sources;
- The development of policies, where appropriate, to address recommendations from the Infill and Residential Development Study that affect water quality; and
- The development of policies to address redevelopment and water quality improvement.

On November 15, 2004, the Board of Supervisors adopted a Comprehensive Plan amendment that served to satisfy these requirements. The amendment included revisions to text in the Environment section of the Policy Plan as well as the incorporation into the Policy Plan of a Chesapeake Bay Supplement that provided detailed discussions of issues related to the CBLAB requirements. On March 21, 2005, CBLAB determined that the Comprehensive Plan, as amended, is fully consistent with the Chesapeake Bay Preservation Act and Regulations.

On July 7, 2003, the Board of Supervisors adopted a revised Chesapeake Bay Preservation Ordinance in order to comply with amendments to the State's Chesapeake Bay Preservation Area Designation and Management Regulations (see section K of this chapter). Of particular note was the incorporation of changes to the designation criteria for Resource Protection Areas (RPAs) to more directly reference water bodies with perennial flow, resulting in a significant expansion to the county's RPA network. A related effort to map all perennial streams in the county (see section G of this chapter) has been completed, and revised maps of Chesapeake Bay Preservation Areas have been prepared.

The agricultural portion of the Chesapeake Bay Preservation Ordinance requires landowners with land in agricultural uses to have conservation plans. The Northern Virginia Soil and Water Conservation District (NVSWCD) prepares soil and water quality conservation plans and provides technical assistance in the implementation of approved plans. NVSWCD has written plans for all Agricultural and Forestal Districts that have Resource Protection Areas within their limits. Currently, NVSWCD is working extensively with horse owners and keepers, since a large percentage of agricultural land use in Fairfax County is related to horse operations. These operations require innovative land management and careful nutrient management to prevent and reduce pollution in runoff to nearby streams.

In 2004, 13 soil and water quality conservation plans were developed for 1,001 acres; 7,070 linear feet of RPAs were included. Cumulatively, 9,960 acres and 267,161 linear feet of RPAs are covered by water quality conservation plans that have been developed since 1994, when the program began. County regulations require conservation plans for establishing and renewing Agricultural and Forestal Districts. As noted in the Ecological Resources chapter of this report, there are 41 Local and two Statewide Agricultural and Forestal Districts in the county. NVSWCD also develops conservation plans for landowners receiving state cost-share money for installing agricultural BMPs, such as manure storage and composting structures or fencing animals out of streams. NVSWCD continues to distribute a brochure it developed for Fairfax County horse-keepers: *Agricultural Best Management Practices for Horse Operations in Suburban Communities*.

3. Erosion and Sedimentation Control and Enforcement-Fairfax County Department of Public Works and Environmental Services

DPWES is planning the implementation of organizational improvements to the Environmental and Facilities Inspection Division (EFID, formerly the Site Inspection Branch) that will result in a greater emphasis and a higher quality of inspection services associated with erosion and sediment control. DPWES will be developing a new quality assurance program and will be training Field Specialists (a newly established position). Field Specialists will be responsible for resolving all erosion and sediment control violations. DPWES will be developing a prioritized inspection program, in accordance with guidelines established by the Virginia Department of Conservation and Recreation, that will consider slope, soil type, proximity to streams, and extents of buffer areas to determine an overall rating for any given site. These proposed resource requirements and organizational improvements are being led by the county's Environmental Coordinator.

a. Inspections

In 2004, the EFID conducted 33,565 Erosion and Sediment (E&S) control inspections, an increase of 15% from 2003. There were averages of approximately 1,530 major plan projects and 1,920 minor plan projects ongoing at any given time in 2004. Currently, 34 site inspectors perform these Erosion and Sediment Control inspections along with other site inspection duties. In 2004, EFID issued an average of 23.35 Notices of Violation (NOVs) per month for violations of Chapter 104 of the Fairfax County Code.

b. Lake Martin

Litigation against two of the upstream developers for off-site damages associated with land development activities has been completed; the developers have been ordered to pay for restoration activities. The county has engaged the services of a consultant to prepare a plan to remove 6,100 cubic yards of sediment from Lake Martin. Additionally, plans to retrofit two upstream existing stormwater

management ponds to protect stream channels that drain into Lake Martin have been drafted. Revisions to the project site were completed in May, 2004. The design for the dredging project was completed and put out to bid in June, 2005.

c. Virginia Department of Conservation and Recreation (DCR) Division of Soil and Water

i. Program review

The DCR reviewed the Fairfax County Erosion and Sediment Control Program in 2002 and gave an "inconsistent" rating. Currently the program has a rating of "Provisionally Consistent" for the four components: Administration; Plan Review; Inspection; and Enforcement. DCR is currently working with the county doing reviews based on a Corrective Action Agreement to bring the program to "Consistent" Status.

ii. Complaints

DCR has received no complaints regarding construction projects under the jurisdiction of Fairfax County since July 1, 2004.

4. Occoquan Basin Nonpoint Pollution Management Program

The Northern Virginia Regional Commission (NVRC) continued in its role as staff to the Occoquan Basin Nonpoint Pollution Management Program. The program was established in 1982 to provide an institutional framework for maintaining acceptable levels of water quality in the Occoquan Reservoir, one of the two major sources of drinking water for much of Northern Virginia. With the release of the 2000 Census data, staff determined that were approximately 363,000 people residing in the Occoquan watershed as of the year 2000. This represents a four-fold increase in population from when statistics were first collected in 1977. NVRC has initiated an update to its 1992 Northern Virginia BMP (Best Management Practice) Handbook. The main emphasis will be on the inclusion of previously innovative, but now accepted, techniques such as rain gardens and some non-structural BMP techniques with demonstrated removal efficiencies. NVRC will coordinate with local jurisdictions to seek input and combine the broad array of interests to revise the manual.

a. Modeling

In October, 2001, the Occoquan Policy Board and Technical Advisory Committee approved a fundamental change in the management structure for the Occoquan Model. A standing Modeling Subcommittee has been created to oversee the model development, which will be handled by Occoquan Watershed Monitoring Laboratory. The result will be a state-of-art model that will be able to take quick advantage of advances in modeling technology.

In 2004, NVRC completed Total Maximum Daily Loads (TMDLs) for bacteria in Occoquan subsheds of Licking and Cedar Run; these TMDLs were adopted by the EPA and State Water Control Board.

5. Soil and Water Conservation District Technical Assistance

In calendar year 2004, NVSWCD:

- Continued to review sites plans and provided technical assistance to county agencies and citizens on erosion and sediment controls, water quality protection, nonpoint source pollution reduction, and stormwater management.

- Reviewed and commented to the county's Department of Planning and Zoning (DPZ) on rezoning and special exception applications, with particular attention to the properties of soils, the potential for erosion, the impact on drainage, stormwater management, and the surrounding land uses and environment.

- Provided technical advice to 669 homeowners and homeowners associations, including 248 onsite visits to advise on erosion, drainage, and other environmental problems, and 45 visits to advise on pond management.

- Demonstrated the *Enviroscape* watershed model six times to a total of 145 people, who learned about watersheds and sources and methods for controlling nonpoint source pollution from various land uses.

NVSWCD created and distributes the *Citizens Water Quality Handbook*, a practical guide to water quality, that contains chapters on watersheds, water conservation, nonpoint source pollution, stream management, wetlands protection, water quality monitoring, environmentally friendly lawn care, specific suggestions for "making a difference," and a listing of agencies and organizations that provide services, information, and help related to water quality.

The *Water Quality Stewardship Guide*, contains useful information on watersheds, water quality, and the sources of nonpoint source pollution, and suggests specific actions citizens can take to improve water quality. It is available on line at http://www.fairfaxcounty.gov/nvswcd/waterqualitybk.htm.

In 2004, NVSWCD distributed 4,217 brochures and flyers related to the reduction of nonpoint source pollution.

6. Virginia Department of Forestry Technical Assistance

In 2004, the Virginia Department of Forestry (VDOF) assisted Fairfax ReLeaf with the development and installation of a rain garden at Crossfield Elementary School. VDOF worked with NVSWCD and DPWES to plan and install a rain garden at Yorktown Square Condominiums. VDOF also participated in over 20 activities, including rain

garden presentations and workshops and watershed/water quality presentations to students, homeowner associations, garden clubs, and professional groups. VDOF created a new rain garden brochure for citizens and will help bring the concept to more people in Fairfax County.

7. Stream Valley Reforestation

In 2004, the Virginia Department of Forestry partnered with volunteers from various organizations, such as the Difficult Run Community Conservancy, Potomac Conservancy, Trout Unlimited, Eagle Scouts, and the Chesapeake Bay Foundation to plant approximately 2,050 seedlings throughout Fairfax County. VDOF assisted an Eagle Scout with a stormwater management project in the Big Rocky Run watershed, which resulted in erosion reduction and stabilization of a 200-foot drainage swale adjacent to New Braddock Road.

VDOF, FCPA, and DPWES are partnering on a stream buffer restoration project that will replenish areas along streams with deficient riparian vegetation. Areas will be determined based on data from the Stream Physical Assessment Study, which identified deficient buffers along over 800 miles of streams.

8. Stream Bank and other Stabilization Projects

a. Accotink Creek Watershed

In October, 2004, Fairfax County Park Authority, VDOF, Trout Unlimited, Dominion Power, and the Department of Game and Inland Fisheries worked together to restore approximately 1,500 linear feet of stream along Accotink Creek between Wakefield Park and Americana Park using bioengineering techniques.

b. Pohick Creek Watershed

In spring, 2004, VDOT used bioengineering techniques to restore a Pohick Creek tributary near Lorton Road. The project was part of VDOT's U.S. Route 1 widening project and field evaluations indicate the project was successful.

c. Huntley Meadows Park - Barnyard Run

The Fairfax County Park Authority and the Department of Public Works and Environmental Services are working on a bond project that would use bioengineering and conventional stabilization practices to protect the stream reaches of Barnyard Run above Huntley Meadows Park. Barnyard Run and its tributary will be rehabilitated using bioengineering techniques.

d. Difficult Run Watershed

The Fairfax County Park Authority has hired a consulting firm to design a stream restoration project to stabilize several hundred feet along two sections of Difficult Run upstream of Georgetown Pike. Construction for the project is expected to commence in June 2005 with completion slated for fall 2005.

e. Fairfax County Stormwater Planning Division

Fairfax County Stormwater Planning Division (SWPD) uses three options to address stream corridor condition:

1. *Nonintervention and undisturbed recovery* – stream corridor is recovering and active rehabilitation or restoration is unnecessary and/or detrimental.
2. *Partial intervention for assisted recovery* – where spot stabilization of stream banks, soil bioengineering techniques, and minor in-stream modifications to correct flow characteristics within the existing stream course are adequate.
3. *Substantial intervention for managed recovery* – requires significant reconfiguration of the stream channel using natural stream design techniques, which typically results in relocating or adjusting a stream's location, cross section, or profile.

These three options are the result of project scoping that includes an overview of the contributing watershed with potential Low Impact Development or other improvements in mind to address prevailing stormwater problems. SWPD has used these options on more than fifteen stream projects in 2004.

9. Septic System Permitting and Repairs

Improperly built and maintained septic systems can often be a source of pollution to surface and ground waters. Approximately 30,000 homes and business are served by septic tank systems in Fairfax County. The county's Health Department has reported that, in fiscal year 2004, 215 new septic systems were constructed, 831 Septic Tank Repair Permits were issued (repairs ranged from total replacement of the system to minor repairs such as broken piping), and there were 721 Septic System Repair Permit approvals. Areas of marginal or highly variable soil remain a concern for future failing septic systems. The Health Department inspects new septic systems that are installed as well as the repair of malfunctioning systems. Further, the Health Department enforces requirements pertaining to failing septic systems when such systems are identified (either through a neighborhood survey or by citizen complaint). However, staff resources do not allow for routine inspections of operating systems.

During 2004, one Sewer Extension and Improvement project extended sewer to ten homes. It should be noted that this does not mean that all ten homes had malfunctioning septic systems; typically, neighborhoods considered for sewer line extensions have a few failing systems along with conditions that evoke concerns about

the potential for more widespread failure (e.g., ages of septic systems; lack of replacement area in case of failure).

10. Sanitary Sewer Maintenance and Repair

Closed circuit television inspection is used to inspect trunk sewer mains to identify defective lines in need of repair. In 2004, 228 miles of old sewer lines and 35 miles of new sewer lines were inspected. Approximately 139,000 feet of sanitary sewer lines were rehabilitated. Over the past seven years, repairs add up to 197 miles of sewer lines. 32 dig-up repairs and 209 trenchless point repairs were completed.

11. Storm Sewer Maintenance and Repair

In 2004, 169 miles of storm sewer pipe were field verified as to location and inspected for deficiencies and maintenance items. The process resulted in 612 work orders being written to correct deficiencies.

G. PERENNIAL STREAM MAPPING PROJECT

A project to field identify perennial streams was initiated in September, 2001 in response to Fairfax County Board of Supervisors' direction as a result of an Environmental Quality Advisory Council (EQAC) resolution relating to the mapping and protection of additional stream segments under the county's Chesapeake Bay Preservation Ordinance. Funding was approved on September 10, 2001. During the fall, 2001, staff developed a draft protocol for field identifying the boundaries between intermittent and perennial streams. Fieldwork was completed by November, 2003 and serves as the basis for delineating perennial stream segments for Resource Protection Area buffers as required by the Chesapeake Bay Preservation Ordinance. On November 17, 2003, the Board of Supervisors adopted the new maps, thus increasing by 52% the amount of stream miles protected (from 520 to 850 miles).

The Fairfax County Stream Classification Protocol, Field Data Sheets, and interactive maps displaying the county's Chesapeake Bay Preservation Areas are available online at www.fairfaxcounty.gov/watersheds/perennial.htm.

Between May and October, 2004, the Quality Assurance/Quality Control Study of the Perennial Streams Identification and Mapping was conducted. A total of 10% of the streams initially surveyed between 2002 and 2003 were selected for the QA/QC study. The majority of the sites were randomly selected; however, many of the sites were target based on the following criteria:

- Visual inspections of tributaries to determine areas that may be suspect;
- Sites where surveys were not conducted by county staff;

- Field notes from original surveys that indicate particular streams that should be resurveyed in different seasons (wetter or drier); and
- Contentious locations.

The results of the QA/QC Study were presented to the Board of Supervisors in spring, 2005 along with revised Chesapeake Bay Preservation Area Maps.

H. WATERSHED PLANNING AND MANAGEMENT

1. Countywide Watershed Planning

In 2003, the Stormwater Planning Division of the Fairfax County Department of Public Works and Environmental Services commenced a watershed planning program to develop new management plans for all 30 county watersheds. The current master drainage plans were developed for the county in the mid 1970s. Data from the countywide Stream Physical Assessment (completed in 2003) in combination with Stream Protection Strategy Baseline Study and other watershed and stream monitoring information are being used for the development of the watershed management plans.

Little Hunting Creek

The development of comprehensive watershed management plans commenced in 2003 with the Little Hunting Creek Watershed. The final Draft Little Hunting Creek watershed Plan was presented in December, 2003. The County Board of Supervisors approved the final watershed management plan on February 7, 2005. The plan includes a multitude of projects, including stream restoration, riparian buffer restoration, installation of rain barrels, improving existing stormwater management facilities, and recommendations on modifying the County Code and PFM. Approximately nineteen projects are in the design and implementation phase.

Popes Head Creek

The Popes Head Creek Watershed management planning process began in September, 2003. Three public forums were held to discuss and raise awareness about various issues within the watershed, disseminate information about these issues, and review and provide feedback on draft plan versions. The final plan is expected to be presented to the Board of Supervisors in January, 2006. The plan includes various projects such as stream restoration, low impact development, water quality improvements to existing stormwater facilities, road and culvert improvements, and recommended modifications to the County Code and the PFM.

Cameron Run

The Cameron Run Watershed management planning process commenced in 2003. An issue scoping forum was held in June, 2004 to collect information from residents on the

types and locations of watershed problems. A second public forum was conducted in October, 2004 to educate citizens about the condition of the watershed. Fairfax County has entered into an agreement with the Army Corps of Engineers and the city of Alexandria to complete a more comprehensive watershed study that includes portions of Cameron Run outside the county. This will place the county in a favorable position to leverage federal funds in the future for plan implementation. A draft plan is expected to be completed and available to the public in fall, 2005.

Cub Run/Bull Run

The Cub Run/Bull Run Watershed management planning process commenced in 2004. The watershed plan is being developed with guidance from a steering committee comprised of residents representing various groups and interests within the watersheds. One public forum and a watershed tour have been held to identify problems areas and raise awareness about issues facing the watersheds.

Difficult Run

The Difficult Run Watershed management planning process commenced in 2004 with the formation of a steering committee that would guide the planning process. Two public forums have been held to educate residents about watershed basics and the condition of the watershed and to collect information about problem areas and issues. The committee is identifying areas for remediation and is researching solutions such as implementing low impact development techniques throughout the watershed. Since the watershed is so large, the committee decided to break up the watershed into three areas and have separate public forums for those residents living in each area to review and comment on the draft plan. The final plan is slated for completion in spring, 2006.

Pimmit Run and Middle Potomac

The Pimmit Run and Middle Potomac watershed management plan encompasses five separate watersheds: Pimmit Run; Bull Neck Run; Scott's Run; Dead Run; and Turkey Run. The planning process began in 2004 with the formation of a steering committee and a public issue forum that was held to identify key problems within each watershed. The final watershed management plan is anticipated to be completed in spring, 2006.

Other Watersheds

Additional watershed management plans anticipated to be started in 2005 include Accotink Creek, Dogue Creek, Little Rocky Run/Johnny Moore Creek, Pohick Creek, and Sugarland Run/ Horsepen Creek. Accelerating the development of the remaining plans in order to complete all county watershed plans by 2008 is being considered.

2. New Millennium Occoquan Watershed Task Force

In 2002, the Board of Supervisors celebrated the 20th anniversary of the rezoning of nearly 41,000 acres of land in the watershed for the purpose of protecting the Occoquan Reservoir (one of two sources of drinking water for the majority of Fairfax residents) from nonpoint source pollution. Included in this celebration was the establishment of the New Millennium Occoquan Watershed Task Force, which was established by the Board to provide guidance on appropriate watershed management efforts 20 years after the rezoning. The Task Force presented a series of recommendations addressing watershed management issues on January 27, 2003. The recommendations of the Task Force provide an assessment of issues facing the Fairfax County portion of the Occoquan Watershed, examine the gaps in programs being carried out by local, state, and regional agencies, help define the role of volunteer organizations that have interests in the watershed, and provide a vision for the future management of the watershed. On July 7, 2003, county staff presented the Board of Supervisors with an implementation plan responding to each of the 29 recommendations of the report. Implementation of the recommendations is ongoing.

I. GROUND WATER ASSESSMENT

The United States Geological Survey (USGS) maintains a series of wells throughout the nation to monitor groundwater levels and drought. Two are located in Virginia; one such well (Site 385638077220101) in Fairfax County has been maintained since 1976. This well provides continuous real-time data that is used by the USGS to assess ground water levels. You can find the information on this well by going to http://groundwaterwatch.usgs.gov.

Neither Fairfax County nor the Virginia Department of Environmental Quality monitors for groundwater levels or groundwater water quality data.

J. DRINKING WATER SUPPLY

The county's water supply comes from the Potomac River, the Occoquan Reservoir, Goose Creek, community wells, and private wells. Fairfax Water (FW), formerly known as the Fairfax County Water Authority (FCWA), provides drinking water to most Fairfax County residents. FW also provides drinking water to the Prince William County Service Authority, Loudoun County Sanitation Authority, Virginia America Water Company (City of Alexandria and Dale City), Town of Herndon, Fort Belvoir, and Dulles Airport. However the City of Fairfax receives its water from the Goose Creek Reservoir in Loudoun County, and the City of Falls Church buys its drinking water from the Washington Aqueduct's Dalecarlia Plant on the Potomac River. Much of the information provided in this section of the Annual Report has been excerpted from guidance provided by Fairfax Water.

With the exception of some wells, prior to use the water must be treated. Fairfax Water provided 50.634 billion gallons of drinking water in 2004.

Table III-3
Fairfax Water -Water Supply Sources, 2004

Sources	Gallons (in billions)
Occoquan Reservoir (Lorton/Occoquan)	20.18
Potomac (Corbalis)	30.32
Wells	0.006
Purchased	0.02
Untreated	0.108
TOTAL	50.634

Source: Fairfax Water

1. Wells

a. Fairfax Water and Public Wells

In 2004, FW operated two wells in Fairfax County, both located in the Riverside Manor Community. These two wells and their distribution systems were monitored monthly for bacteriological quality and annually for Volatile Organic Compounds (VOCs). In addition, the wells were tested semiannually for metals, nutrients, solids, odors, color, pH, alkalinity, and turbidity. In 2004, the monitoring results for both wells and distribution system met the current requirements of the Virginia Department of Health Waterworks Regulations.

Lead and copper monitoring in accordance with EPA and Virginia Department of Health (VDH) Waterworks Regulations was performed on the distribution system in 2004. The system met all EPA Lead and Copper regulatory requirements and continued on an Ultimate Reduced Monitoring schedule by VDH due to the low levels found. The next scheduled collection is during 2005.

Tests of FW Riverside Manor Well system indicate the presence of radon in the water. Radon is naturally occurring substance and it is not unusual to be present in groundwater resources in Fairfax County. Health effects from radon exposure have found to be far greater from indoor air as opposed to water. For this reason, the Fairfax County Health Department advises residents who may be concerned about radon in their homes to test the indoor air levels. Radon is not currently regulated in public drinking water systems. FW removed the Riverside Manor Subdivision water system from ground water service in 2005, thus effectively eliminating drinking water-borne radon contamination.

b. Private Wells

There are approximately 12,000 single family residences that are served by individual well water supplies in Fairfax County. In 2004, 144 New Well Permits were issued for single family residences. There were 265 wells closed in 2004.

2. Lorton and Corbalis Systems Monitoring Results and Reports

a. Trihalomethanes, Chloramines, and other By-products of Water Treatment

Trihalomethanes are by-products of chlorination water treatment and are thought to be carcinogenic.

b. Trihalomethanes (THM) Monitoring Project

The 2004 distribution system running quarterly averages were below the Maximum Contaminant Levels (MCL) for total trihalomethanes (TTHM) of 80 µg/l. The 2004 running quarterly averages for TTHMs were 18 µg/l and 34µg/l for the Corbalis and Lorton distribution systems, respectively.

c. Disinfectant/Disinfection By-products (D/DB-P) Rule

EPA has promulgated Stage I of the D/DB-P Rule, which lowers the total THM MCL from 100 µg/l to 80 µg/l. This rule took effect in January, 2002 (TTHM - Total Haloacetic Acids, Bromate, and Chlorite and the Disinfectants, Chlorine, Chloramine, and Chlorine Dioxide).

In addition, the disinfection by-product "Haloacetic Acid 5" (HAA5) will be regulated at a level of 60 µg/l. The 2004 HAA5 distribution system running quarterly averages were below the Maximum Contaminant Level (MCL) of 60 µg/l. The 2004 running quarterly averages for HAA5s, as reported to the Virginia Department of Health, were 19 µg/l and 37 µg/l for the Corbalis and Lorton distribution systems, respectively.

The rule also sets a Maximum Residual Disinfectant Level (MRDL) for chlorine of 4 µg/l in drinking water. The MRDL for chlorine was 3.2 mg/l in 2004.

d. Heavy Metals

FW tests drinking water quarterly for Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Lead, Magnesium, Mercury, Nickel, Potassium, Selenium, Silver, Thallium, and Zinc and on a monthly basis for Iron, Manganese, and Sodium. The levels of these metals monitored in 2004 continue to be below their MCL or Secondary MCL (SMCL). "The concentration levels for the unregulated metals were within an expected range." The report is available for review on the web at www.fairfaxwater.org.

e. Enhanced Surface Water Treatment Rule (ESWTR)

The ESWTR assumes revisions to the current Surface Water Treatment Rule may be necessary to provide additional protection from pathogenic organisms. The fist step toward developing the ESWTR was the microbiological monitoring required under the Information Collection Rule. The first year of the data has been used to develop requirements for the interim ESWTR. The long-term ESWTR will be based on additional data collection and refinement. The proposed ESWTR will provide for a sanitary survey of the entire system, a maximum contaminant level goal for cryptosporidium of zero, and treatment requirement alternatives. Possible additional requirements may include notifying the state as soon as possible about persistent turbidity levels above the performance standards that might not necessarily be violations.

f. Other Monitoring Programs

Fairfax Water monitored 3,307 distribution taps for total coliform bacteria in 2004. Each month's compliance report was within the regulatory limits for the EPA's Total Coliform Rule**.**

During 2004, FW monitored surface source waters and finished drinking water for 42 volatile organic compounds (VOC) and 39 synthetic organic compounds (SOC). Finished water is collected at the point of discharge from water treatment plants to the distribution system. No VOCs were detected in the source waters except for trace amounts of MtBe (Methyl tertiary butyl ether), a non-regulated parameter. MtBE is a gasoline additive that has received public attention recently. In some parts of the U.S., MtBE has been detectable in high amounts in source waters. The only VOCs detected in the finished water systems were TTHMs and trace amounts of MtBE. The few SOCs that were detected in the finished and source waters were at trace levels significantly below the Maximum Contaminant Levels (MCL). Specific information can be found in the FW Annual Report on Water Quality for 2004, available on line at www.fairfaxwater.org.

During 2002, FW monitored 53 customer taps for lead and copper in accordance with the EPA regulations. FCWA met all EPA and VDH requirements for this rule and has been put on Ultimate Reduced Monitoring status due the prolonged low results. The next scheduled monitoring will be in the summer of 2005.

g. Residuals Disposal

Residuals occur as the result of heavy sediment loads entering the freshwater intakes and having to be removed from the water prior to treatment. "Maryland and Virginia farmers consider the high calcium carbonate content of the dewatered residuals to be beneficial soil additives." Residuals generated at Corbalis continue to be applied by contract to agricultural lands in Maryland and Virginia. FW is studying the possible use of polymers in lieu of lime in the dewatering process. If

polymer condition dewatering becomes feasible, the solids volume for disposal may decrease. FW is expecting to begin design of new dewatering equipment some time in 2006.

h. Consumer Confidence Reports

Federal regulations require water suppliers to provide annual reports on the quality of the drinking water to their customers through the Consumer Confidence Report (CCR) Rule. FW customers received their first annual CCR in the summer of 1999. The 2004 Water Quality Report is available for review on the FW Web site at http://www.fairfaxwater.org.

3. Source Water Assessments

The 1996 Amendments to the Safe Drinking Water Act (SDWA) provided for source water assessment and protection programs designed to build a prevention barrier to drinking water contamination. Under SDWA, states are required to develop comprehensive Source Water Assessment Programs that identify the areas that supply public tap water, inventory contaminants, and assess water system susceptibility to contamination. Fairfax Water, through a grant from the Virginia Department of Health, has completed an inventory of potential sources of contamination and a survey of land use activities within the Potomac and Occoquan Watersheds. The Virginia Department of Health is currently reviewing the complete Source Water Assessment. This is available for review on the FW website at http://www.fairfaxwater.org.

4. Facilities Management

a. New Occoquan Water Treatment Plant (Griffith WWTP)

FW is nearing completion of the new Griffith Water Treatment Plant, a 120 mgd (million gallons per day) facility, expandable to 160 mgd, to replace the existing Lorton and Occoquan treatment plants in Lorton. In addition to flocculation and sedimentation, the Griffith Water Treatment Plant will include advanced treatment processes of ozone disinfection and biologically active, deep bed, GAC (granular activated carbon) filtration. Construction of the plant began in spring, 2000 and was approximately 90% completed as of July, 2004. Full use of the plant is currently scheduled for fall, 2005. The raw water pumping station associated with the new plant is completed and has a capacity of 120 mgd, expandable to 160 mgd.

b. Potomac Water Treatment Plant (Corbalis)

This plant located near Herndon, Virginia is currently treating up to 150 million gallons a day taken from an offshore intake on the bottom of the Potomac River. The third 75 mgd phase, which will bring the plant capacity up to 225 mgd, is currently under construction and scheduled to be in service in 2008. The plant is designed for an ultimate capacity of 300 mgd. This utilizes ozone as a primary

disinfectant, flocculation-sedimentation, biologically active filters with carbon caps, and chloramine final disinfection.

5. Regional Cooperative Water Supply Agreements

In order to protect the ecosystem of the Potomac River during low flow periods, the three major water utilities in the Metropolitan Washington area have signed water allocation agreements for water use during these low flow periods. Two upstream dams, Jennings-Randolph on the Potomac River and the Savage River Dam, along with Seneca Lake in Montgomery County, Maryland, are storage facilities for drinking water supplies during low flow periods. While the Potomac River has flows that average above 7,000 million gallons a day, the river has often reached flows well below that, usually in late summer and early fall. The lowest recorded flow in this region was 388 mgd at Little Falls in September during the drought of 1966. This is an adjusted figure that does include the withdrawal allocation of 290 mgd. In 1981, the three major metropolitan water utilities, including Fairfax Water, signed the Low Flow Allocation Agreement, which creates a protocol for allocation of water from the Potomac during periods of low water. The current environmental flow recommendations are 300 mgd downstream of Great Falls and 100 mgd downstream of Little Falls. In 2002, the Maryland Department of Natural Resources revisited this issue of the flow level necessary to support aquatic habitat in the Potomac River and was unable to replicate the methodology used to create the present low flow requirements in the agreement. Droughts that occurred in 1999 and 2002 called attention to the concern that these flows, derived by the 1981 study which was conducted during a period without extreme low flows, needed to be revisited in light of new scientific methods and low-flow information. Responding to these concerns, in 1999 the Maryland Department of Natural Resources (MD DNR) formed a Potomac Flow-by Committee involving resource agencies, environmental organizations, water utility representatives, and other parties to provide guidance for re-evaluation. During the drought of 2002, MD DNR's Power Plant Citing Program assembled teams of biologists from their staff and Versar, Inc, with assistance from Montgomery County, Maryland, and the Interstate Commission on the Potomac River Basin, which performed habitat assessments during that year's low flow conditions.

On April 8, 2003, the Maryland Power Plant Research Program and the Interstate Commission on the Potomac River Basin sponsored a one-day workshop with a panel of nationally recognized experts on habitat assessment to investigate and develop methods to evaluate the environmental flow-by requirements. Their conclusion of the present low-flow agreement is that: "Existing biological data and understanding are inadequate to support a specific, quantitative environmental flow-by." At this workshop, members of the special panel collectively considered and debated the various methodologies applicable to the Potomac River to address the flow-by issue. The final product of the workshop is a set of recommendations for 1) the best method or approach, given current financial resource limitations, to address the Potomac Flow-by Study objectives, and the level of confidence associated with their recommendations, and 2) an alternative long-term method or approach which could

better accomplish those objectives, yet might exceed current resources or available data, and recommended guidelines for achieving the objectives in a longer time-frame.

In September 2003, MD DNR's Power Plant Siting Program issued a report entitled "Habitat Assessment of the Potomac River From Little Falls to Seneca Pool" (Final Document #PPAD-03-1), which provided substantial background information describing the history of current low-flow requirements, a review of the studies conducted to support those requirements, and a report on habitat assessment conducted during low-flow conditions in 2002. The assessment included development of a habitat map, a field survey of habitat types, and measurements of hydraulic and water quality conditions, spanning the period of July through October 2002 when flows were as low as 151 million gallons per day at the gage at Little Falls Dam.

In November 2004, ICPRB convened an update meeting to discuss recent developments in USGS mussel studies and further defining desired hydrological regimes. The next step will be a workshop with regional and national aquatic biologists to develop targeted species and guilds for re-evaluating ranges of tolerance during low-flow events in the study area.

Full reports on these activities can be viewed at:
http://www.esm.versar.com/pprp/potomac/default.htm.

In February, 2004, FW adopted the Occoquan Reservoir Shoreline Easement Policy, which places limits on what may be done within FW's easement surrounding the reservoir. The policy prohibits construction of any structures other than piers and floats. Removal of any vegetation, storage of fuels or chemicals, application of pesticides, and placement of debris are also prohibited in this area. The policy is intended to protect the reservoir's riparian buffer.

In June, 2005, the State Water Control Board adopted the Water Supply Planning Regulation (9 VAC 25-780). This regulation requires all cities and counties in the Commonwealth to submit water supply plans to the Virginia Department of Environmental Quality (DEQ). Each water supply plan must include a description of existing water resources and water use, projected demands, a description of water management actions/conservation measures, segment of need for future supplies and alternative analysis, and local government resolution approving the plan. DEQ is revising the Virginia Water Protection Permit regulation to incorporate various elements of the water planning process as they relate to permitting of withdrawals.

a. Interstate Commission on the Potomac River Basin (ICPRB) Cooperative Water Supply Operations (CO-OP)

The ICPRB plays several important roles in providing for the region's current and future water supply needs. The CO-OP Section facilitates the agreement among the three major water utilities (Fairfax Water is one) that require water suppliers to coordinate resources during times of low flows in the Potomac River. The Water

Resources Section also provides technical water resources management assistance to the jurisdictions throughout the basin. Flow in the Potomac River was more than adequate to meet drinking water withdrawal needs by the region's major utilities in 2004. There were no releases from upstream reservoirs necessary to augment water supplies. The ICPRB annually coordinates a weeklong drought management exercise that simulates water management operations and decision making under drought conditions for the Metropolitan Washington area water supplies. Annual simulation allows for renewal of coordination procedures with the water suppliers and other agencies, an opportunity for public education and outreach, and review and improvement of operational tools and procedures. The 2004 report can be viewed at http://www.potomacriver.org/info_center/publications.htm#2005

b. Metropolitan Washington Area Council of Governments (COG) Water Supply and Drought Awareness Plan

In response to the droughts of 1998 and 1999, COG brought together a task force in May, 2000 to coordinate regional responses during droughts to reduced availability of drinking water supplies. The plan consists of two components: (1) a year round plan emphasizing wise water use and conservation; and (2) a water supply and drought awareness and response plan. The Interstate Commission on the Potomac River Basin handles the administration of the coordinated drought response for water withdrawals from the Potomac River and during low flows. Additionally, the CO-OP Section works with COG and the Drought Coordination Committee to assist in providing accurate and timely information to basin residents during low-flow conditions in the Potomac River. In process is a campaign targeted to specific audiences to reduce water use based on the Arizona Water Use It Wisely campaign. Based on a poll conducted in February 2002 for COG, many respondents did not have a basic knowledge of the water supply system. Those most likely to practice water conservation were women over 45. Those least likely to conserve water were males 18 to 24, non-bill payers, lower income residents, and renters in Washington, D.C.

K. NEW LAWS OR REGULATIONS

1. Amendments to the Chesapeake Bay Regulations

December 10, 2002, the Chesapeake Bay Local Assistance Board (CBLAB) adopted its final amendments to the Chesapeake Bay Preservation Area Designation and Management Regulations. These amendments include a revised method to assign Resource Protection Areas (RPAs) to perennial streams. Fairfax County had until December, 2003 to submit its revised Chesapeake Bay Preservation Ordinance to CBLAB. As noted earlier in this chapter, the Board of Supervisors adopted a revised Ordinance on July 7, 2003 and accepted the revised perennial stream maps as a basis for implementation in November, 2003. CBLAB has determined that the county's

revised Ordinance is consistent with the Chesapeake Bay Preservation Act and Chesapeake Bay Preservation Area Designation and Management Regulations.

2. New Stormwater Legislation HB1177

This legislation, signed on April 8, 2004 by Governor Warner, encourages jurisdictions to adopt stormwater management ordinances that use the concept of Low Impact Development (LID) to the maximum extent practicable. The legislation also transferred the stormwater permitting authority from DEQ to DCR effective in January, 2005. Additionally, the legislation allows the state to transfer the administration of the Erosion and Sedimentation (E&S) permitting for land disturbing activities to jurisdictions, allows these jurisdictions to charge permitting fees for review, and establishes that jurisdictions must transmit 30% of these fees to the state. The target date for the transfer of the permitting program to jurisdictions is set for July 1, 2006; however, this is subject to approval by the US EPA.

L. AWARDS

Fairfax County received recognition by the Chesapeake Bay Program as a Gold Award recipient for the second time since 1997 under the Chesapeake Bay Partner Community program. "The Chesapeake Bay Partner Community Award recognizes, encourages and supports local government in the Chesapeake Bay watershed whose actions demonstrate their commitments to protecting and restoring the Chesapeake Bay, its rivers and its streams."

The National Association of Counties presented Fairfax County with a 2004 Achievement Award for the county's innovative Watershed Management Program.

M. OVERVIEW

2004 was another significant year for watershed protection in Fairfax County.

-Adoption of the *Comprehensive Vision for Fairfax Environment* in June 2004. This plan includes: 1) conversation of our limited natural resources must be interwoven into all governmental decisions and 2) the Board must be committed to provide the necessary resources to protect our environment. Of particular interest, the Water Quality section states the following: protect those streams whose waters are still of relatively high quality from becoming impaired with pollutants; consider watershed protection when reviewing and deciding all land use actions; implement new watershed management plans and stream protection strategies; pursue a dedicated source of funding; allow and encourage better site design practices that protect our streams; ensure strict enforcement of erosion and sediment control laws; encourage use of vegetative buffers; and stabilize streams using sound scientific principles that mimic natural systems. The Environmental Stewardship section

states the following: encourage organizations involved in stream monitoring and stream valley restoration to involve schools and citizens of all ages.

-The new Chesapeake Bay Preservation Ordinance, passed in 2003, increased protection to all perennial streams by changing the criteria for designation of Resource Protection Areas. Civil and criminal penalties are available to address violations. Based on DPWES work finished in 2003, the Board of Supervisors adopted the new maps as the basis for administration of the Chesapeake Bay Preservation Ordinance on November 17, 2003, thus increasing by 52% the amount of stream and shoreline miles protected from 638 to 968 miles (including 118 miles of shoreline). DPWES conducted the Quality Assurance/Quality Control study of perennial stream mapping between May and October, 2004. A total of ten percent of the streams initially surveyed were selected for QA/QC process. The results of the QA/QC Study along with the revised RPA maps were presented to the Board of Supervisors in spring, 2005.

-The County is in the process of completing Watershed Management Plans for each of the county's 30 watersheds; the Little Hunting Creek Watershed Plan was the first watershed plan to be completed and was approved on Feb 7, 2005. Watershed management planning efforts were initiated for Popes Head Creek and Cameron Run watersheds in 2003. The Cub Run/Bull Run, Difficult Run, Pimmit Run, and Middle Potomac (Bull Beck Run, Scott's Run, Dead Run, and Turkey Run) watersheds had their planning processes begin in 2004. It is anticipated that this countywide watershed planning effort will be completed in 2008. These plans will serve as guidance for all stream restoration and protection efforts in the county. Implementation of these plans is estimated to occur over the next twenty-five years.

-The New Millennium Occoquan Watershed Task Force was established as part of the 2002 Board of Supervisors' celebrations of the 20th Anniversary of the rezoning of nearly 41,000 acres of land in the Occoquan Watershed. On July 23, 2003, county staff presented the BOS with an implementation plan responding to each of the 29 recommendations of the report, which are in the process of being implemented. An updated status report was presented in 2004.

-In 2004, the Environmental Coordinating Committee's Regional Pond Subcommittee developed a draft implementation plan for stormwater management to address the previously identified 61 recommendations targeted at improving Fairfax County's stormwater management program and to clarifying the role of regional ponds within that program. The recommendations address the use of regional ponds, suggest the inclusion of other innovative and non-structural techniques, and suggest changes in the Public Facilities Manual, stormwater policies, codes and ordinances.

-Much of the local work of monitoring the streams in Fairfax County is now being coordinated in the Stormwater Planning Division of the Department of Public Works and Environmental Services (DPWES); beginning in 2004, the Stormwater Planning Division assumed responsibility for the annual Stream Water Quality Report that was previously

prepared by the Health Department. The 2004 Comprehensive Stream monitoring report will be released in fall, 2005.

-Implementation of the Infill and Residential Development Study Report, accepted by the Board of Supervisors in January, 2001, which had 29 separate recommendations addressing stormwater, erosion and sediment control issues continues.

In addition the following two actions continue to have significant impacts on environmental and watershed stewardship in the county:

-The reformation of the Environmental Coordinating Committee under the Deputy County Executive and the work and guidance of the Environmental Coordinator have done much to coordinate environmental planning within the county.

-In September 2002, the Board of Supervisors adopted an amendment to the Policy Plan volume of the Comprehensive Plan to revise criteria that are used to evaluate residential development proposals. This amendment includes a heightened emphasis on environmental protection, including stormwater management. *Developments should minimize off-site impacts on water quality by commitments to state of the art best management practices for stormwater management and low-impact site design techniques . . . . The volume and velocity of stormwater runoff from new development should be managed in order to avoid impacts on downstream properties. Where drainage is a particular concern, the applicant should demonstrate that off-site drainage impacts will be mitigated and that stormwater management facilities are designed and sized appropriately. Adequate drainage outfall should be verified and the location of drainage outfall (onsite or offsite) should be shown on development plans.*

However, Fairfax County streams and watersheds continue to be impacted by four basic problems:

-Stormwater runoff and erosion continue to be the largest problems within Fairfax County streams. **A key requirement for controlling stormwater discharge is to limit post development runoff to that which does not exceed pre-development runoff rates.** The notion of "adequate outfall' theoretically exists but does not seem to exist in real time. Most Fairfax County streams have increased runoff flows that exceed the capacity of their stream channels. This has created an ongoing erosion cycle that includes eroding stream banks, heavy sediment loads, and sedimented stream bottoms. Recent research has shown that over 60% of the sediments in damaged streams are the direct result of stream bank erosion. Streams can become damaged by the changes brought about by changes in stream hydrology and increased flow during the pre-development clearing phase. The stream sees an overall increased flow due to the increased runoff caused by the clearing. This is not just the increase in peak flow, but the increase in the total volume of the water entering the stream. These increased flows start the cycle of damage, and once the stream is damaged it may take years or decades for the stream banks to revegetate and restabilize. This has resulted in erosion problems throughout the county on trail systems, homeowners' backyards, business' landscapes, and transportation infrastructure such as bridge

abutments. Sediment on stream bottoms results in reduced habitat and diversity, and compromises food webs within watersheds.

Sediment also compromises the quality of, and increases the expense of, treating the drinking water within the Occoquan Reservoir. Poor land use planning, inadequate enforcement of soil and erosion laws, and inadequate stormwater management in past years has significantly contributed to these erosion problems. Prevention of such damage would not only be good for the environment but would also be cost effective. Prevention of this damage can be assisted by strict monitoring and enforcement of the stormwater management control system prior to construction and not allowing predevelopment runoff flows to increase during the development phase. Only a few streams, such as Walney Creek in E. C. Lawrence Park, remain undisturbed and excellent examples of healthy streams in Fairfax County.

--In addition to problems created in streams, these ongoing erosion patterns have resulted in numerous small ponds and lakes having enormous sediment deposition, which requires frequent maintenance and dredging to maintain pond depth. All ponds fill in over time with sediment and organic material. Depending on the size of the surrounding drainage area, the land uses in that area, and the volume of runoff, a pond can fill up with sediment, trash, and organic debris in a relatively short period of time. Stormwater management ponds are designed to significantly protect downstream water quality. In urban areas, these ponds often provide additional amenities including recreation (boating, fishing), aesthetics, and wildlife habitat. Although dredging is a necessary management component to remove accumulated materials, we have exacerbated the problem because increased impervious surface, in addition to lack of on-site detention for developments, have significantly impacted these facilities. The county maintains many of the stormwater management ponds; however homeowners' associations and other private pond owners also have ponds with sediment problems. This is an issue given the significant dredging expense and lack of local, adequate disposal areas.

-Secondly, at times, high levels of fecal coliform bacteria, particularly E. coli bacteria, occur in specific streams throughout the county.

-Thirdly, progress has been made in this area with the addition of language to the Policy Plan section of the county's Comprehensive Plan; watershed and stream protection, however, need to be maximized in land use planning and site design decisions; the cumulative effects of land use decisions on Fairfax County's streams need to be effectively considered.

-Lastly, although much of the responsibility for stream protection and restoration efforts have been coordinated within DPWES, conflicting results have occurred as stormwater management strategies and policies suggested within one area of DPWES have conflicted with waivers granted by others, often resulting in degraded stream habitat.

Much credit needs to be given to Fairfax County for pursuing its efforts in comprehensive watershed management, including stream restoration and protection and adequate

monitoring of water resources. All of these efforts indicate a significant change in county policy and practice towards the protection and restoration of county streams. However, as long as the rate of stream degradation surpasses stream protection and restoration efforts in Fairfax County streams, the trend will continue to be a downward one.

N. RECOMMENDATIONS

1. We commend the Board of Supervisors for its actions this spring (2005) authorizing one penny of the real estate tax to be dedicated to the stormwater management program. The amount for this coming fiscal year will be an additional $17.9 million dollars. This is a significant contribution to implementing the recommendations outlined in the county's comprehensive watershed management plans, including retrofitting and rehabilitating existing and aging stormwater management facilities and infrastructure.

   However, since this commitment will require reauthorization every year, EQAC continues to encourage the creation of a more stable funding source for watershed improvement.

2. EQAC is pleased that Fairfax County is investigating and reexamining the current definitions and requirements pertaining to adequate outfall. However, EQAC cannot over emphasize the importance and need for increased monitoring of predevelopment stormwater management controls and taking enforcement action to ensure inadequate controls are corrected prior to construction and if necessary during construction. It is also important that the county hire the appropriate number of staff to handle the estimated inspection workload. We are also pleased that staff is in the process of creating regulations that will enforce the PFM requirements for detention during the development phase. This is another enforcement tool that will protect streams during the construction phase. We recommend that the Board of Supervisors approve both of these initiatives.

3. EQAC strongly recommends that Fairfax County (the Board of Supervisors, the Planning Commission, the Board of Zoning Appeals, the Fairfax County Park Authority and various county agencies) continue to coordinate efforts and develop a protocol for assessing the impacts and cumulative effects of land use considerations and decisions on the county's water resources. EQAC urges them to use and disseminate this information to protect the county's watersheds. EQAC commends the Board for adopting Residential Development Criteria that include supporting the provision of adequate drainage outfalls and innovative water quality measures.

4. EQAC commends county staff for investigating and evaluating LID and innovative BMP techniques for inclusion in the PFM. EQAC recommends that the county continue to encourage innovative practices that incorporate bioretention and recharge to aquatic systems. EQAC recommends that appropriate DPWES, DPZ, and LDS staff members are educated on reviewing designs and inspecting projects that incorporate these new techniques. Additionally, EQAC recommends that staff coordinate efforts on developing a process through which these plans are assessed in a timely manner.

5. EQAC continues to support the full funding and implementation of the comprehensive countywide watershed management program. EQAC strongly endorses the ongoing work of county staff with their watershed planning and public outreach efforts and comprehensive stream monitoring program.

   EQAC continues to support:

   a) Continued assessments of watersheds, including identification of point and nonpoint sources, levels of erosion, riparian buffer coverage, percentage of impervious surface, and vegetative cover;

   b) Equal importance should be devoted to environmental protection, restoration, and monitoring as compared to infrastructure improvement and maintenance;

   c) Maintenance and inspection of county BMPs at the highest level;

   d) Development of a stream protection and restoration program that has adequate sustainable funding;

   e) The coordination of all relevant water quality and stream data and data analysis from all sources including the Stream Protection Strategy Baseline Study, Physical Stream Assessment Study, Comprehensive Stream Monitoring Program, and watershed planning program; and

   f) Granting a minimum number of waivers and reducing the granting authority to a single department so that all waivers must be reviewed and either accepted or denied by the stormwater management program responsible for watershed planning (i.e., the Stormwater Planning Division of DPWES).

6. EQAC continues to recommend posting of health warnings for county streams with high fecal coliform and E. coli bacteria levels until an investigation is conducted and the source of the contamination is identified and remediated. EQAC recommends that these investigations are carried out and remediation plans be implemented whenever there are actual threats to public health. Because county streams continue to have high bacteria coliform counts, EQAC recommends developing a public information campaign and sign posting program that contains the following language from the 1999 Health Department report: *"The use of streams for contact recreational purposes, such as swimming, wading, etc. which could cause the ingestion of stream water or possible contamination of an open wound by stream water, should be avoided."*

7. EQAC is pleased to note the MS4 requirement to develop a long-term watershed monitoring program to verify the effectiveness and adequacy of stormwater management goals and identify areas of water quality improvement or degradations. EQAC further recommends a monitoring program to evaluate the effectiveness of stormwater detention facilities. While EQAC understands that a comprehensive countywide program to monitor effectiveness would be cost-prohibitive, data are still needed, as it is still unclear

as to which structures and requirements are effective and working well. At a minimum, monitoring a representative sampling of different types of stormwater facilities throughout the county is recommended.

8. As the need for dredging of stormwater management ponds continues to increase due to impacts associated with increased impervious surfaces in addition to lack of on-site detention for developments, pond owners will need assistance to carry out this necessary maintenance. The county maintains many of the stormwater management ponds; however homeowners' associations (HOAs) and other private pond owners also have ponds with sediment problems. It is becoming more difficult to dredge and remove excess materials from ponds as a result of rising expenses, the increasing need to dredge more frequently due to increased sediment loading, and lack of local, adequate disposal areas. Developing partnerships between Fairfax County, the Park Authority, HOAs and private pond owners and creating spoil disposal/recycling areas in various parts of the county should be considered, especially since these efforts culminate in improving the county's water resources. Dredge material could be recycled and/or used to renovate athletic fields, thereby reducing maintenance costs. As dredging needs continue to increase, it seems necessary and beneficial to explore options. The county could consider the possibility of this being a revenue-generating operation.

9. EQAC commends the county for its existing stream protection requirements for perennial streams, which increased from over 600 miles to over 900 miles as a result of the perennial stream mapping program. EQAC further encourages the Board of Supervisors to support future protective measures for intermittent and headwater streams such as the establishment of protective buffers on either side of a stream.

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